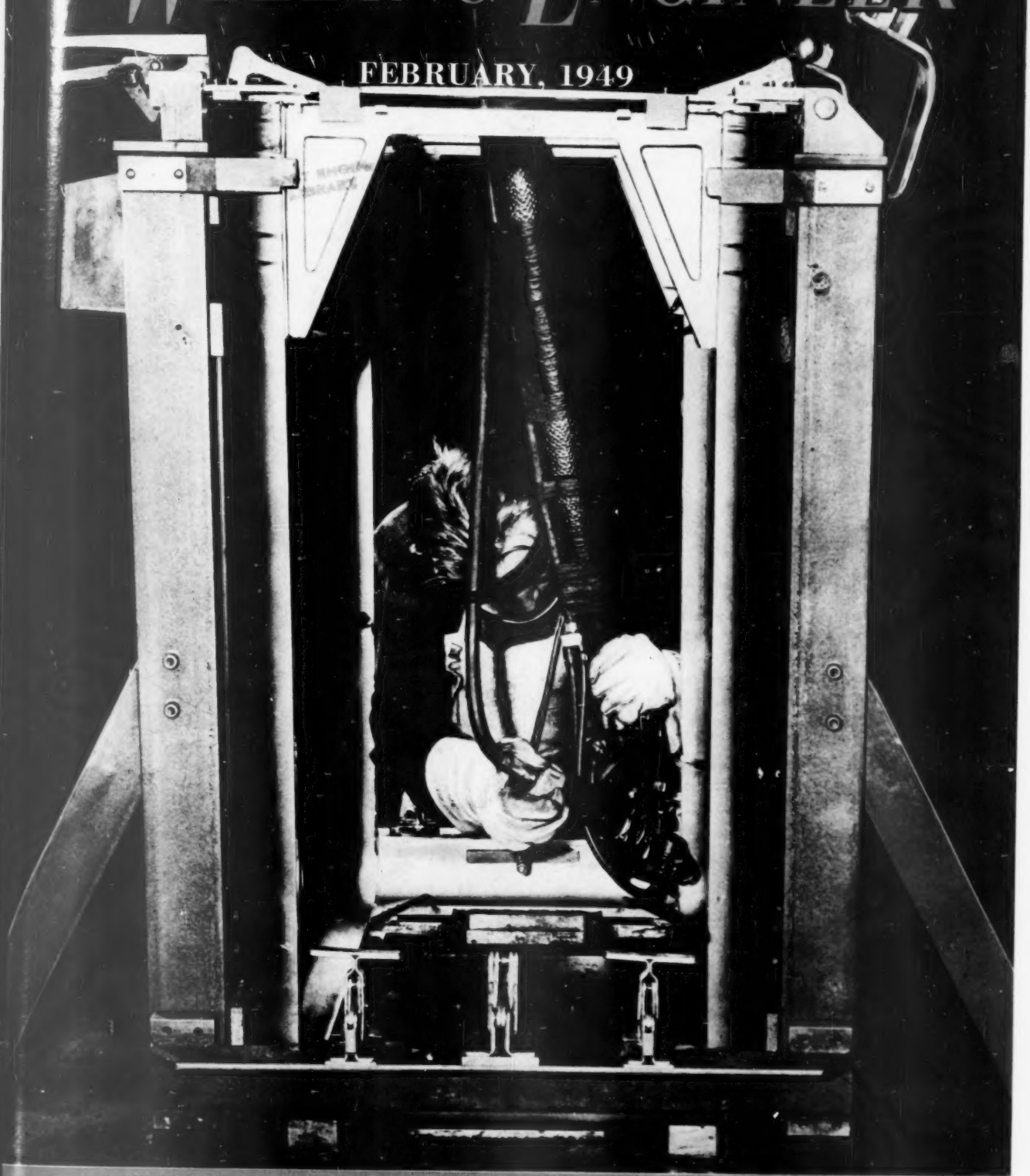
THE WELDING ENGINEER

FEBRUARY, 1949



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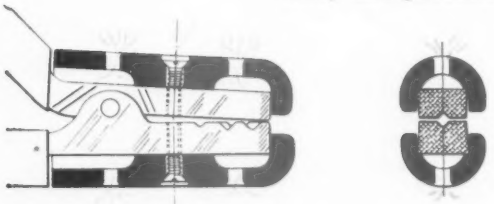

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THE WELDING ENGINEER

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A McGRAW-HILL PUBLICATION

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THE WELDING ENGINEER

ESTABLISHED 1916 FEBRUARY, 1949

Something for Nothing

SINCE THE VERY beginning of civilization, man has tried to obtain gold from lead. Perpetual motion, another way of saying riches without effort, has been a popular quest, too. The end of all such schemes has always been the same—proof that you can't get something for nothing.

History, which is a record of past mistakes, bears out the above conclusion. Every nation which rose to greatness in the past began to decline as soon as it started to adopt socialistic policies. A dictator of Athens replaced thrift and frugality with an elaborate and expensive program of public works. Look what happened to the Athenians of the next generation in their long conflict with Sparta! Rome, too, began to go down as soon as the stern simplicity of the Republic was replaced by the bread and circuses of Roman emperors.

The basic laziness of human beings prompts them to seek an easy road to success. That's why we have so many race tracks, slot machines, punch boards and give-away radio programs. The political version of the something-for-nothing philosophy is, however, the most dangerous. To strip it of its camouflaging verbiage, the idea is simply to take away from the so-called "haves" and give to the "have nots." Neither the demagogues who advocate this unjust social program nor the rapacious multitude who clamors for it bother to think about what will happen when the "haves" run out of something to give.

Utopia is a lovely word, promising peace and plenty for everyone, but it never seems to work out in practice. Committees and bureaus are poor substitutes for the creative powers of free individuals. The more paternal the government, the more stifling an effect it has upon the initiative of its citizens. The rule of the unrestrained majority puts the minority—which in reality may be an unorganized majority—completely at the mercy of the mob. Tumbrils to the guillotine are the next logical step.

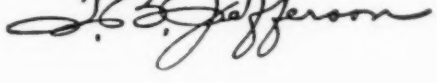
England voted for the something-for-nothing plan at the close of the last war. Despite lavish "borrowings"—the government of England in the past eight years has received about $18,000,000,000 from freedom-loving America—the British ship of state has been barely kept afloat. The socialistic schemes promoted have made everyone more poor.

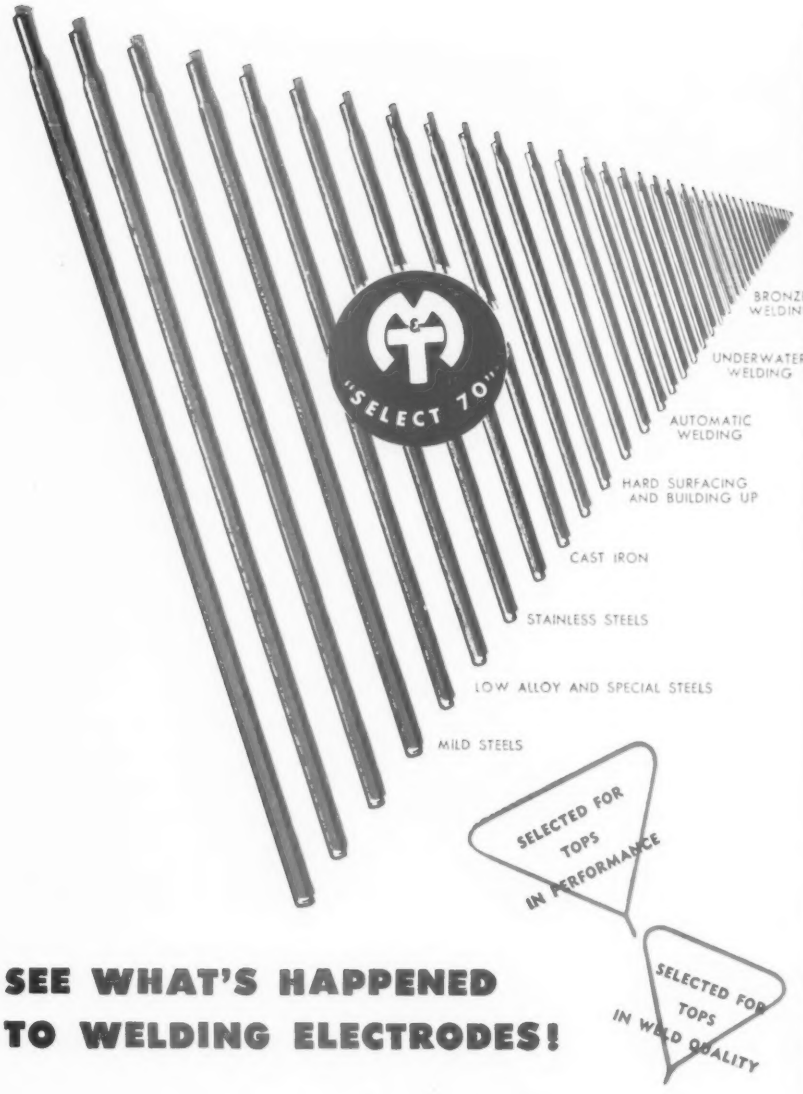
The Chancellor of the Exchequer, Sir Stafford Cripps, bragged recently in print about the manner in which incomes have been leveled in England. In 1939 over 11,000 English families had incomes of $20,000 or more a year; in 1948 only 250. Unfortunately, such leveling always means dragging down, never raising up. Incomes of the British lower classes have not been improved; in terms of what money is allowed to buy they are probably worse off than they have ever been.

A government which lowers top salaries to the level of unskilled labor may be popular with the masses but it offers little scope to the ambitious. Such a political system may not produce grossly overpaid movie stars and Jack Bennys, but it will certainly sacrifice the Henry Fords, Edisons, Westinghouses and others of their type who have helped to make America great.

As far as our own industry is concerned, we cannot do better than quote from the magazine *Welding*. In discussing the possible nationalization of the iron and steel industry (Mr. Truman would like to have five billion dollars for experiments along this line), this British publication states: "As has happened with the prices of nationalized coal and electricity, we may expect a rise in the price of steel generally. . . As for welding electrodes, we have already seen what government aid can do in that direction by allowing the import of expensive foreign brands and depriving our own factories of wire. Under the new regime it may be expected that this state of affairs will be allowed to continue. Highly probable increases in the prices of such wire as may be available will strike a crippling blow at welding, which must remain an economic process if it is to be used at all."

In theory one of your best friends is your Congressman. Have you written to that best friend lately? Better keep him posted as to your thinking on the present trend. We don't want it to happen here.





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Time was when you had to tackle almost every arc welding job with just one electrode. Now electrode types come by the score.

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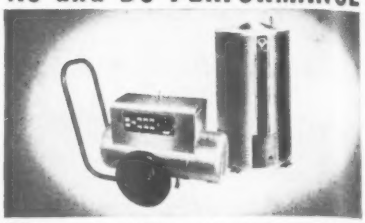
NEW ARC WELDERS BOOST AC and DC PERFORMANCE



FASTER welding, better quality welds, lower power costs, and simplified maintenance are furnished by a new line of AC and DC arc welders introduced by Metal and Thermit Corporation.

Built-in capacitors for high power factor, wide current range for full rated output, and, fingertip, stepless current control for precise current setting are featured in the AC units. Available in 150 to 500 amp. models for manual arc welding, additional models for inert arc and automatic welding.

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Descriptive folder gives full particulars. Address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

ACCESSORY DIVIDENDS DECLARED

UNDERSCORING the importance of proper accessories to top welding performance, more and more fabricators are taking pains with selection of accessories. Speedier, lower cost, safer and improved welding are assured when such items as helmets, shields, holders, connectors, cleaning tools and protective clothing are carefully selected. And more and more fabricators—sold on M & T electrode and arc welder performance — are specifying the M & T line of "accessories to the perfect weld." For descriptive literature, address Metal and Thermit Corporation, 120 Broadway, New York 5, N. Y.

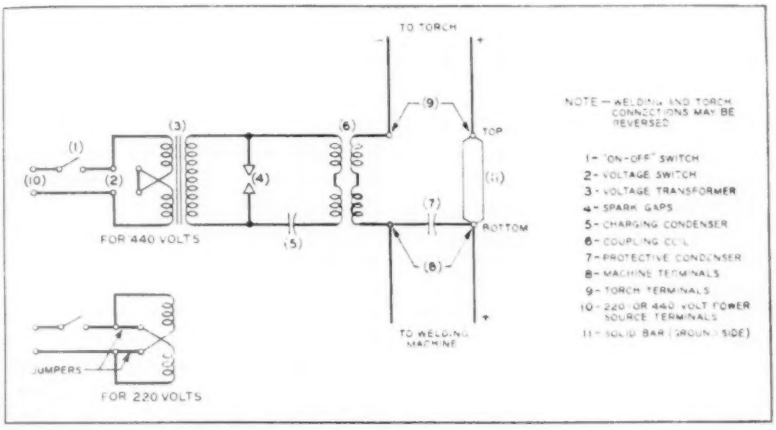
Courtesy The Linde Air Products Co.

H-F STABILIZED a-c welding is rapidly replacing other methods in the inert-gas-shielded process

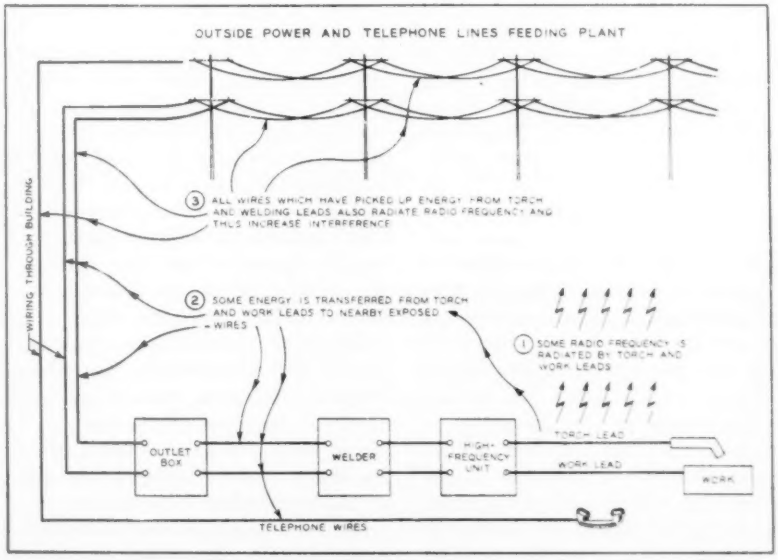
That Problem of

Radio Interference

How to avoid radio interference with high-frequency stabilized installations for inert-gas arc welding is detailed in recently published manual by a NEMA committee. Short welding leads, special grounds, shielding of exposed wires are among the necessary steps



1—SCHEMATIC DIAGRAM of high-frequency generator, purpose of which is to convert ordinary 60-cycle a-c into a high-voltage, h-f stabilizing current


OUTSIDE POWER AND TELEPHONE LINES FEEDING PLANT
WIRING THROUGH BUILDING
3 ALL WIRES WHICH HAVE PICKED UP ENERGY FROM TORCH AND WELDING LEADS ALSO RADIATE RADIO FREQUENCY AND THUS INCREASE INTERFERENCE
2 SOME ENERGY IS TRANSFERRED FROM TORCH AND WORK LEADS TO NEARBY EXPOSED WIRES
1 SOME RADIO FREQUENCY IS RADIATED BY TORCH AND WORK LEADS
OUTLET BOX
WELDER
HIGH-FREQUENCY UNIT
TORCH LEAD
WORK LEAD
WORK
TELEPHONE WIRES

2—RADIO ENERGY is radiated from the welding leads as well as from nearby exposed wires, which act as antennas to transmit the disturbance

CONSIDERING the thousands of installations of high-frequency stabilized (subsequently abbreviated to hfs) arc welders for the inert-gas-shielded arc-welding process, interference with communications systems has not been serious in the past. The anticipated growth of the process, however, indicates that action should be taken to avoid future interference.

To study this problem, the Joint Industry Committee on High-Frequency Stabilized Arc Welders was formed several months ago under the sponsorship of the Arc Welding Section of the National Electrical Manufacturers Association. The information which follows is taken largely from the committee's newly published manual, "Recommended Practices for the Installation of High-Frequency Stabilized Arc Welding Equipment," prepared by R. R. Lobosco, of The Linde Air Products Co.

It is best to start by giving some explanation as to how the high-frequency stabilized (hfs) arc welder may cause radiation. While the welding arc itself may cause some radiation, the greater part has its source in the high-frequency stabilizing unit which converts power supplied as 60-cycle (or 25-cycle) alternating current into high-voltage, high-frequency current. Fig. 1 shows a typical circuit. If this high-frequency current is of the same order of frequency as that of some radio transmitter, it may cause interference in any receiver located in the vicinity of the hfs welder and tuned to that radio transmitter.

At the present time, all stabilizing

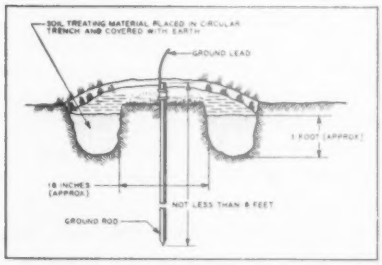
units are of the spark-gap type. While these units are designed to operate at some fundamental frequency, no attempt is made to hold them to very close frequency tolerances. Therefore, various high-frequency units of the same make and type can cause radio interference with different radio stations since the signal emitted is fairly broad and may cover a band of frequencies rather than a single sharply defined frequency.

Harmonic Frequencies

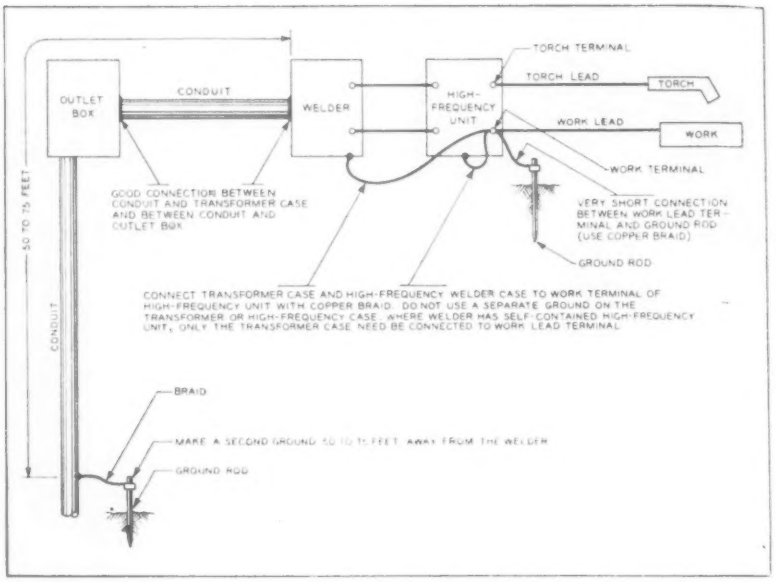
The stabilizing unit may emit several other frequencies, usually at a lower intensity than the fundamental frequency. These other frequencies may be harmonic or spurious frequencies. The harmonic frequencies are multiples of the fundamental frequency, always higher in frequency than the fundamental. The spurious frequencies bear no particular relation to the fundamental and may be either higher or lower in frequency. The fundamental, the harmonic and the spurious frequencies are all capable of causing interference to a radio station operating at one of these frequencies.

As an illustration, take the case of a typical high-frequency unit supposed to operate at a frequency of 1,700,000 cycles per second. It may deliver frequencies ranging from about 1,650,000 to 1,750,000 cycles per second. There may be some other spurious frequencies of lesser signal strength, perhaps at 2,200,000 and 2,700,000 cycles per second, and in addition there may be harmonics of the fundamental or base frequency which would produce radiation at 3,400,000, 5,100,000, 6,800,000, etc., cycles per second.

The degree of interference caused by an hfs welding station to a broadcast station will, to a large extent, depend upon local conditions. One of the most important factors is the strength of the desired signal from the broadcast station as compared to the strength of the unwanted signal. The closer the radio receiver is to the hfs installation, the more likely it is to pick up interference. Similarly, the closer the radio receiver is to the broadcasting station, the more likely it is to get interference-free reception. The more powerful the broadcasting station, the less probability there is of interference from an hfs installation for any given distance. Thus in a locality served by a number of powerful nearby broadcasting stations, good reception can be obtained from a radio receiver located fairly near an hfs installation, but in an area remote from broadcasting stations an hfs installation may interfere over a wider area.


SOIL TREATING MATERIAL PLACED IN CIRCULAR TRENCH AND COVERED WITH EARTH
GROUND LEAD
1 FOOT (APPROX)
18 INCHES (APPROX)
NOT LESS THAN 8 FEET
GROUND ROD

3—OUTSIDE GROUND circled by a salted trench. The crystals are gradually dissolved by surface water to keep the soil conductive


OUTLET BOX
CONDUIT
WELDER
HIGH-FREQUENCY UNIT
TORCH TERMINAL
TORCH LEAD
TORCH
WORK LEAD
WORK
WORK TERMINAL
GOOD CONNECTION BETWEEN CONDUIT AND TRANSFORMER CASE AND BETWEEN CONDUIT AND OUTLET BOX
VERY SHORT CONNECTION BETWEEN WORK LEAD TERMINAL AND GROUND ROD (USE COPPER BRAID)
GROUND ROD
50 TO 75 FEET
CONDUIT
CONNECT TRANSFORMER CASE AND HIGH-FREQUENCY WELDER CASE TO WORK TERMINAL OF HIGH-FREQUENCY UNIT WITH COPPER BRAID. DO NOT USE A SEPARATE GROUND ON THE TRANSFORMER OR HIGH-FREQUENCY CASE. WHERE WELDER HAS SELF-CONTAINED HIGH-FREQUENCY UNIT, ONLY THE TRANSFORMER CASE NEED BE CONNECTED TO WORK LEAD TERMINAL
BRAID
MAKE A SECOND GROUND 50 TO 75 FEET AWAY FROM THE WELDER
GROUND ROD

4—NO GROUND to work is preferred connection when wiring is in conduit

Welding Leads

In an installation in which all of the power wiring, lighting wiring and telephone wires are shielded or are remote from the high-frequency unit, the major part of the latter's radiation will be from the welding leads and will, in most cases, be too small to cause any interference.

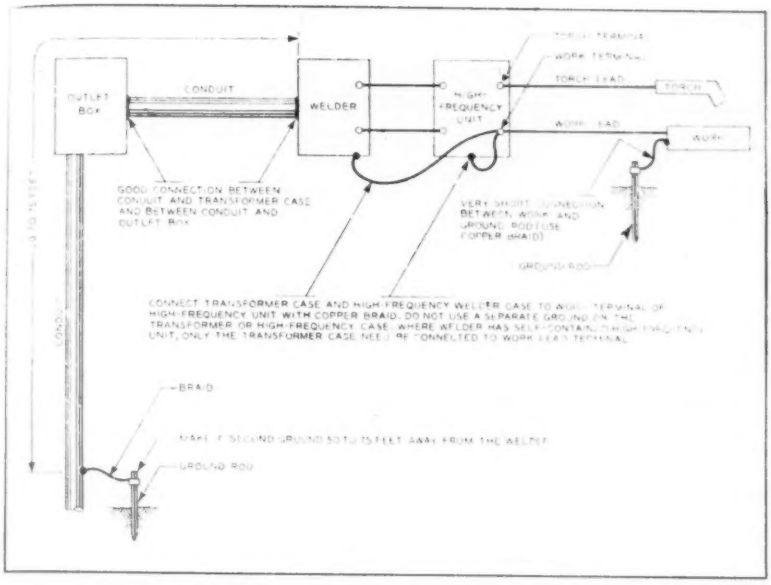
The amount of radiation is dependent upon the length of the welding leads; the longer the leads, the greater the radiation. The welding leads should, therefore, be made as short as possible, consistent with convenience in welding. If a separate hfs unit is used, connections between it and the welder should be made as short as possible.

Up to the present time, no completely satisfactory means has been found for shielding the welding leads. However, work is now being done along these lines.

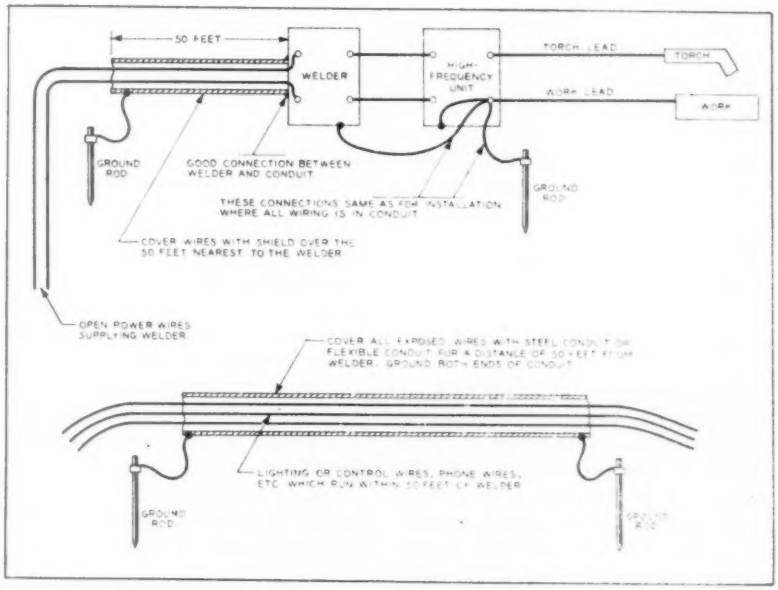
In installations where the power wiring is not in conduit or where there are unshielded lighting, telephone or control wires near the welder, another factor than the welding leads must be considered.

Electromagnetic Coupling

Any circuit which carries current sets up around itself a field which extends for some distance in all directions. Any other circuit within the influence of this field is said to be coupled to the first circuit. Thus a circuit carrying a high-frequency current, such as the welding leads, can transfer a part of this current from the welding leads to other unshielded power wiring, telephone wires, etc. These wires, in turn, will act as antennas and also radiate the high-frequency current. Since they are usually considerably longer and higher than the welding leads, they are much better radiators. As appreciable coupling between the circuits of welding leads and unshielded wires can take place when the latter are within a 50-ft radius of the welding leads, all of the wiring within


OUTLET BOX
CONDUIT
WELDER
HIGH-FREQUENCY UNIT
TORCH LEAD
TORCH
WORK LEAD
WORK
GOOD CONNECTION BETWEEN CONDUIT AND TRANSFORMER CASE AND BETWEEN CONDUIT AND OUTLET BOX
VERY SHORT CONNECTION BETWEEN WORK AND GROUND ROD (USE COPPER BRAID)
GROUND ROD
CONNECT TRANSFORMER CASE AND HIGH-FREQUENCY WELDER CASE TO WORK TERMINAL OF HIGH-FREQUENCY UNIT WITH COPPER BRAID. DO NOT USE A SEPARATE GROUND ON THE TRANSFORMER OR HIGH-FREQUENCY CASE. WHERE WELDER HAS SELF-CONTAINED HIGH-FREQUENCY UNIT, ONLY THE TRANSFORMER CASE NEED BE CONNECTED TO WORK LEAD TERMINAL
BRAID
MAKE 2 SECOND GROUND 50 TO 75 FEET AWAY FROM THE WELDER
GROUND ROD

5—GROUND CONNECTION to work is an alternate connection to Fig. 4


50 FEET
WELDER
HIGH-FREQUENCY UNIT
TORCH LEAD
TORCH
WORK LEAD
WORK
GROUND ROD
GOOD CONNECTION BETWEEN WELDER AND CONDUIT
THESE CONNECTIONS SAME AS FOR INSTALLATION WHERE ALL WIRING IS IN CONDUIT
GROUND ROD
COVER WIRES WITH SHIELD OVER THE 50 FEET NEAREST TO THE WELDER
OPEN POWER WIRES SUPPLYING WELDER
COVER ALL EXPOSED WIRES WITH STEEL CONDUIT OR FLEXIBLE CONDUIT FOR A DISTANCE OF 50 FEET FROM WELDER. GROUND BOTH ENDS OF CONDUIT
LIGHTING OR CONTROL WIRES, PHONE WIRES, ETC. WHICH RUN WITHIN 50 FEET OF WELDER
GROUND ROD
GROUND ROD

6—OPEN WIRING in a plant calls for grounded shielding as depicted here

this radius and of the welding equipment itself should be placed in conduit or shielded as later described. Fig. 2 illustrates how radiation can take place.

Usually, the radiation from any welder will be less while welding than under the open-circuit conditions, where the high-frequency unit is on but the operator is not welding. One way to minimize radio interference, therefore, is not to turn on the high-frequency unit until the operator is ready to make a weld and to turn off the high-frequency unit as soon as the weld has been completed. A number of control circuits have been developed to turn the high-frequency unit on and off automatically.

Spark-Gap Adjustment

The output of the hfs unit is dependent upon the setting of the spark gaps. The wider the spark-gap setting, the greater is the power which is delivered to the electrode holder and which is radiated. It has been customary to use a much wider setting than is actually necessary for good performance. An unnecessarily large setting could cause excessive radio interference.

Most high-frequency units will operate in a satisfactory manner with a spark-gap setting of not more than 0.005 in. per gap for a two-gap machine. Some of the older units require settings of as much as 0.008 or 0.010 in. and more for satisfactory welding.

By using as short a welding lead as possible, by setting the spark gaps to as low a gap setting as is consistent with good welding and by not having the high-frequency unit turned on unless welding is taking place, radiation can be reduced. It can likewise be very greatly reduced by a properly made installation. Factors such as the proper grounding of the welding equipment, the shielding of exposed wires and the use of filters enter into the making of a good installation.

Grounding the Circuit

Proper grounding of the welding circuit will greatly reduce the interference in most cases. It is very important that not more than one ground be used anywhere in the welding circuit. Tests have shown that the best place to make the ground connection is usually to the work terminal of the welding transformer if the high-frequency unit is a part of the transformer or the work terminal of the high-frequency unit if a separate one is used. The ground should be as short and as direct as possible.

In general, water pipes, electrical conduit systems, etc., should not be used as grounds for the hfs welding circuit. Nor does the steel frame of a building or a wall of a corrugated-iron building make a satisfactory ground.

The best ground is a copper-weld ground rod driven into the ground as close as possible to the machine. This is a standard device used by power and telephone companies for grounding purposes and it consists of a pointed steel rod with a heavy copper coating welded to the steel core. Copper-weld rods are easy to drive into the ground and will last much longer than steel pipe or other substitutes. In an emergency, an ordinary steel or brass pipe can be used, but it will be found that rust and electrolytic corrosion will rapidly de-

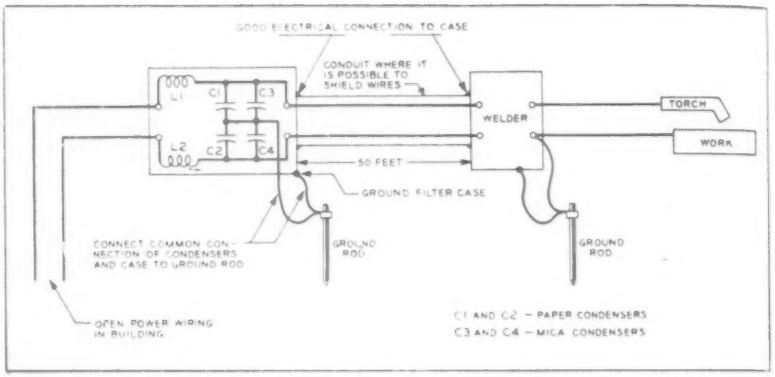
stroy the pipe, particularly if it is in contact with ground-treating electrolyte, as will be later explained.

A rod having a length of 8 ft and a diameter of either ½ or ⅝ in. is recommended. The connection from the ground rod to the work terminal of the welding transformer or high-frequency unit should be made by means of heavy copper braid, using standard copper-weld clamps. The copper braid should consist of at least 240 strands of No. 30 wire or its equivalent and should in no case be smaller than the work lead of the welder. A heavier braid can be used.

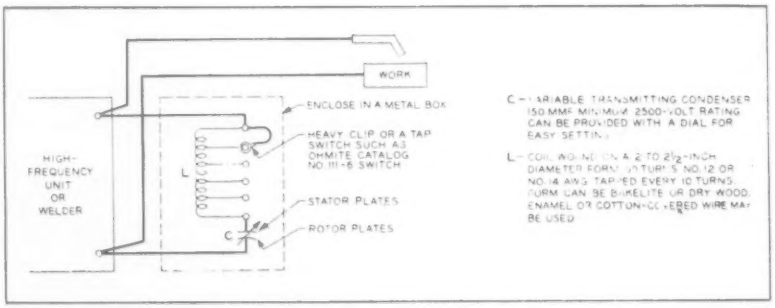
To avoid danger of a shock in the event that one of the circuits is accidentally grounded to the transformer case, the case should be grounded by running a piece of braid from it over to the work terminal of the transformer. Do not run a separate ground to the transformer case as it may, under certain conditions, greatly increase the amount of radio interference.

The work or worktable should not be grounded since the addition of a ground at this point will generally increase the amount of radiation. If it is impossible to avoid a ground at the work or worktable, then make it the only ground in the system. The ground connection to the transformer case can still be connected to the work terminal of the transformer or of the high-frequency unit. However, the transformer case will secure its ground through the ground lead of the welding circuit, to the worktable and thence to the ground rod. The welder case should not be grounded by means of a third conductor in the primary cable. The welder should not be operated unless the case is grounded in accordance with the foregoing.

When the welding transformer is located near an outside wall and the earth beyond this wall is exposed, the ground rod can be placed outside the building. Where a ground lead more than 8 ft long is required to reach an outside ground rod, it is best to use a ground rod inside the building, immediately adjacent to the welding transformer. Should the building have a concrete floor, it will be necessary to make an opening of approximately 6 in. in diameter in order to be able to treat properly the earth around the ground rod. The rod should be driven below the level of the concrete surface and a cover for the opening provided to avoid accidents.



7—SPACED FILTER should be located at least 50 ft from welder in order to be effective. The filter, case and shield should all be grounded, as shown


WORK
ENCLOSE IN A METAL BOX
HEAVY CLIP OR A TAP SWITCH SUCH AS OHMITE CATALOG NO. 111-B SWITCH
HIGH-FREQUENCY UNIT OR WELDER
L
C
STATOR PLATES
ROTOR PLATES
C—VARIABLE TRANSMITTING CONDENSER 150 MMF MINIMUM 2500-VOLT RATING CAN BE PROVIDED WITH A DIAL FOR EASY SETTING
L—COIL WOUND ON A 2 TO 2½-INCH DIAMETER FORM, 14 TURNS NO. 12 OR NO. 14 AWG TAPPED EVERY 10 TURNS. FORM CAN BE BAKELITE OR DRY WOOD. ENAMEL OR COTTON-COVERED WIRE MAY BE USED

8—ABSORPTION CIRCUIT provides a wave trap for harmonic or spurious frequencies. Circuit is tuned by means of coil-and-condenser combination

Soil Treatment for Ground

The lower the resistance between the ground rod and the surrounding earth, the lower will be the radiated signal. It has been found that the signal will be lowered by an appreciable amount if the earth around the ground rod is treated with a conducting solution known as an electrolyte.

For an outside ground, dig a circular trench around the ground rod as shown in Fig. 3. Place in this trench 20 to 30 lb of copper sulphate, magnesium sulphate or rock salt. Flood the trench several times and allow the water to sink into the ground. Continue this procedure until at least half of the salt has dissolved and soaked into the ground. The trench can then be covered over with earth. Normal rainfall will generally keep the ground moist enough to continually dissolve more salt, which will continually renew the electrolyte.

For an inside ground, fill the 6-in. hole around the ground rod with copper sulphate, magnesium sulphate or rock salt and flood the hole a number of times until at least 8 or 10 lb have dissolved and soaked into the earth. Then fill the hole with the salt and let it remain in this condition. It will be necessary to flood the hole periodically in order to keep enough electrolyte in the ground circuit. Therefore provide a removable cover instead of pouring concrete around the ground rod.

Shielding of Plant Wiring

Usually installations having open power wiring cause the most radiation. Even a few feet of exposed (unshielded) wire near the welding leads will pick up enough energy to cause considerable interference. The wires connecting the welding transformer to the building wiring (which is in conduit) should be covered with a shield without gap from end to end and a good connection made from the shield to the welding transformer case and to the conduit box.

If there are any unshielded telephone, lighting or power wires in the vicinity of the welding transformer,

they should be enclosed in a shield for a distance of at least 50 ft in all directions from the welding transformer and welding leads. This shield should be connected to a ground at some point near the welder and to another ground at the extreme end of the shields.

Rigid steel conduit, flexible steel conduit or lead-covered cable provide satisfactory shielding if well bonded: *i.e.*, if a good electrical connection is made between joints, fittings and boxes in the shielding system. Where a number of wires run parallel to each other, they can be placed in one common shield.

Needless to say, any changes in the electric wiring should be handled by a competent electrician. Before touching the telephone wires, the nearest telephone company office should be notified and permission secured to make the necessary changes.

Shielding System Ground

In addition to a ground at the work terminal of the welder or of the high-frequency unit, another ground should be connected to the conduit or shielding system approximately 50 or 75 ft away from the welder. The second ground connection is not as critical as the first and can be 12 or 15 ft long without causing a pronounced increase in radiation. Here, a water pipe can be used if it enters the ground near the place where the conduit is to be grounded. If another copper-weld ground rod is used, follow the same installation and ground-treating procedure outlined for the first ground. See Figs. 4, 5 and 6.

In some cases, particularly in small buildings, unshielded overhead power lines feeding power to the plant pass very close to a building wall. If the welder is located near that same wall, high frequency may couple directly from the welding leads into the outside power wires, even though the proper precautions have been taken with the wiring inside the building. Therefore locate the welder as far as possible from overhead open-wire power lines.

Small corrugated-iron buildings, in which many hfs welder installations have been located, are supposed to act as shields to prevent radiation, but it has been found that such a building may actually act as a radiator unless it is properly grounded. It is advisable to provide several grounds around the perimeter of the building, and these can be made with metal pipe or ground rods. A good copper-braid connection should be made from the ground rod to the metal wall of the building. For best results, the earth around each ground rod should be treated.

Power-Line Filters

If the radio receivers receiving the interference are located close to the welder, it may be necessary to take steps additional to the use of shielded wiring. The use of a "spaced filter" in the power line will usually help. Such a filter will also usually effect a substantial reduction in radiation in cases in which it is not possible to put shielding over the wiring.

In order to be effective, the filter should be located approximately 50 ft away from the welder. If a shield has been placed over the power line, the spaced filter should be located at the far end of the shield. The filter, the filter case and the shield should be grounded as shown in Fig. 7.

If all of the plant wiring is in conduit, the place where the power service wires enter the building is a good location for the spaced filter.

If it is found necessary to use a power-line filter, it is suggested that the welding equipment manufacturer be consulted. Filters having a large enough current capacity for some welders will probably have to be made to order. Among manufacturers of power-line filters are: the Cornell-Dubilier Co., Plainfield, N. J.; the Aerovox Co., New Bedford, Mass.; the P. R. Mallory Co., Indianapolis; and Tobe Deutschmann, Norwood, Mass.

Wave Traps

When the interference is on a frequency higher than 2½ megacycles, the chances are the interference is being caused by a harmonic or a spurious frequency. Some form of wave trap, such as that shown in Fig. 8, can be used to absorb this frequency without interfering with the fundamental frequency.

In Fig. 8 the circuit is connected directly across the electrode holder and work terminals of the high-frequency unit or welder and must be tuned to the interfering frequency. The easiest way of tuning this circuit is to have a radio receiver tuned to the interfering signal; then, with the entire coil connected in the circuit, turn the condenser of the absorption circuit slowly from one end of the dial to the other. When the circuit is properly tuned to the interfering frequency, the latter should suddenly drop out or be greatly reduced in volume. If this does not occur with the full coil in the circuit, move the coil adjustment to the next tap and repeat the procedure until the combination of coil and condenser setting is found which will reduce the interference to a minimum.

Practically all of the radio-frequency energy will be absorbed by the coil and condenser combination if the latter is tuned to the fundamental frequency of the hfs unit. Very little of it will reach the electrode holder, which will be evidenced by a weak spark or the complete absence of a spark at the holder. In the exceptional cases where wave traps are indicated, it is suggested that the manufacturer of the welder be consulted.

Perhaps Welder's Not Guilty

Since there are some electrical devices which are capable of causing radio interference almost identical with the interference caused by hfs welders, a quick check should be made to determine if the interference is actually being caused by the hfs welder. The easiest way is to listen in on the radio receiver while the hfs welder is being turned on and off. If the interference does not stop when the hfs unit is turned off, obviously the latter is not the cause of it. Where more than one welder is being used, each hfs unit should be tested individually, all the others being turned off.

To summarize, the following steps should be taken on *all* installations:

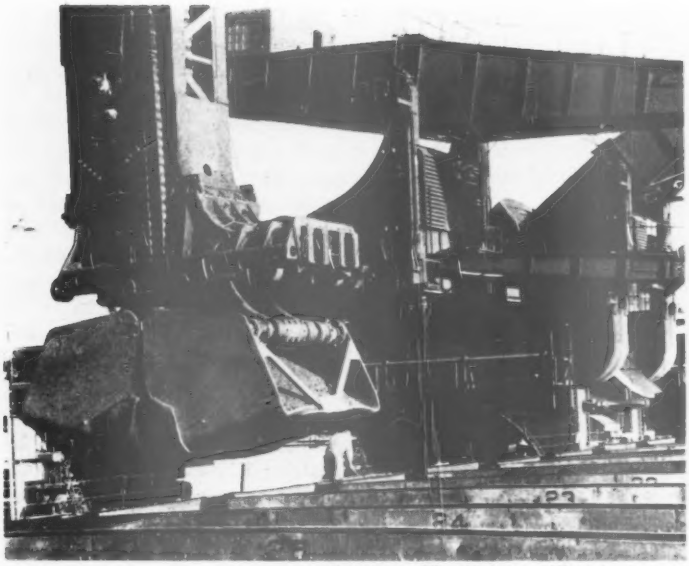
(*a*) Make sure that the spark gaps of the high-frequency unit are at the smallest setting which will give satisfactory welding results. Usually this will be 0.005 in. per gap or less for most new two-gap machines.

(*b*) Properly ground the welding circuit.

(*c*) Use the shortest welding leads which can be conveniently used. Keep them on or near the floor.

(*d*) The high-frequency unit should not be turned on unless the

(*Continued on page 48*)



Courtesy Westinghouse Electric Corp.

MAINTENANCE WELDING keeps the lips tight on this ore unloader. Of the steel mills reporting, 96% do maintenance welding

Courtesy Haynes Stellite Co.

HARD-FACING is used on rolls, soaking pit tongs, other parts subject to abrasive wear

What Welding Means to America

★ PART ONE: Primary Metals Industries

BY T. B. JEFFERSON

WALK through almost any type of metal-working plant, and you will see many examples of welding and flame-cutting. If further evidence is required that welding and related processes are in widespread use throughout American industry, consider the fact that $306,000,000 were spent in a single year for welding machines, apparatus, electrodes, welding rods and welding gases. Manufacturers' sales records indicate that over a half billion pounds of electrodes and many billion cubic feet of oxygen and acetylene are consumed yearly.

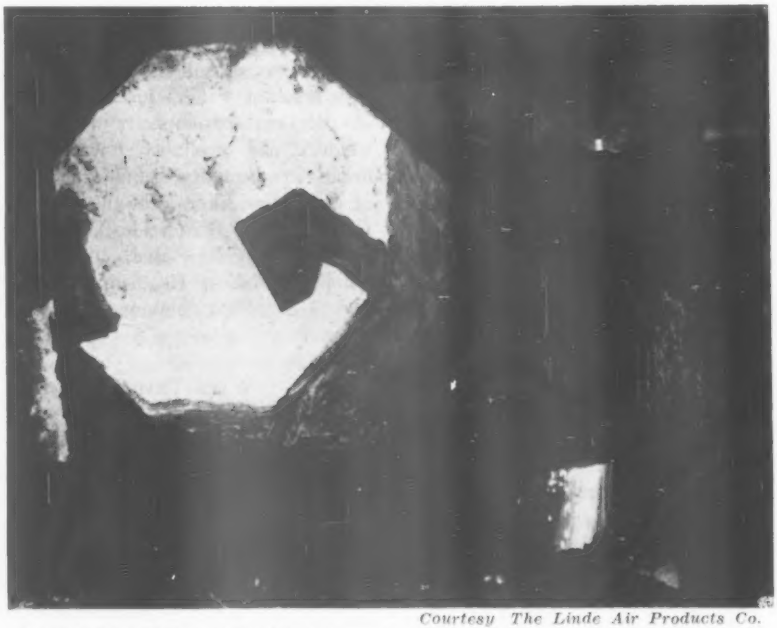
WHO ARE THE USERS?

Of course everyone knows that welding and cutting processes are found in the primary metals industries, in transportation industries, machinery manufacture, sheet-metal fabrication, shipbuilding, etc. But who uses what, what for and how much? The answers to these questions have been sought by manufacturers and distributors of welding equipment for many years. THE WELDING ENGINEER has been deluged with requests for specific information on the welding market. Hitherto such queries have been answered only in a general way and as the result of editors' personal observations.

Now, at last, THE WELDING ENGINEER has secured concrete information!

In the first comprehensive survey

(Continued on page 64)



Courtesy The Linde Air Products Co.

NOT YET COLD, a 553,000-lb ingot is trimmed with the oxyacetylene flame

Table I. Analysis of Respondents by Industries

Primary Metals Industries	Plants Surveyed	No. Plants Responding	Do Welding Number	Do Welding Percent	Do Not Weld Number	Do Not Weld Percent
Blast furnaces, steel works and rolling mills	400	122	119	98	3	2
Iron and steel foundries	569	221	197	89	24	11
Primary smelting and refining of non-ferrous metals	84	45	45	100	—	—
Secondary smelting and refining of non-ferrous metals and alloys	46	18	18	100	—	—
Rolling, drawing and alloying of non-ferrous metals	226	72	65	90	7	10
Non-ferrous foundries	188	79	67	85	12	15
Miscellaneous	225	78	69	88	9	12
Total	1,738	635	580	91	55	9

Table II. Maintenance and Production Welding

Primary Metals Industries	Maintenance Welding Total*	Arc	Gas	Resistance	Production Welding Total*	Arc	Gas	Resistance
Blast furnaces, steel works and rolling mills	117	108	97	8	34	41	25	17
Iron and steel foundries	187	176	145	5	99	92	54	6
Primary smelting and refining of non-ferrous metals	45	45	43	8	15	12	11	4
Secondary smelting and refining of non-ferrous metals and alloys	19	16	17	—	7	4	4	3
Rolling, drawing and alloying of non-ferrous metals	65	53	56	7	24	9	14	13
Non-ferrous foundries	68	60	59	7	19	18	18	1
Miscellaneous	67	58	59	4	35	24	16	16
Total	568	516	476	39	253	200	142	60

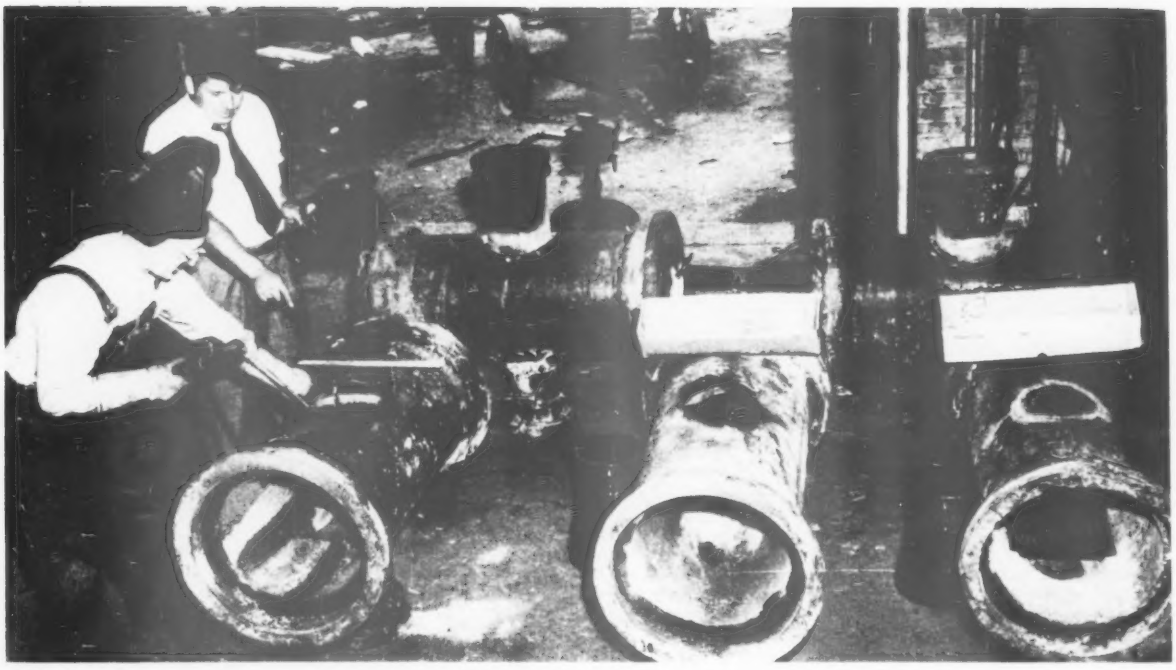
The figures for arc, gas and resistance welding exceed the total because of duplication of types of welding within plants

Table III. Sizes of Plants

Primary Metals Industries	Number of Employees 50-99	100-499	500-999	1,000-2,499	2,500+	Total
Blast furnaces, steel works and rolling mills	10	72	18	15	4	119
Iron and steel foundries	20	146	25	6	—	197
Primary smelting and refining of non-ferrous metals	—	28	9	8	—	45
Secondary smelting and refining of non-ferrous metals and alloys	—	11	5	2	—	18
Rolling, drawing and alloying of non-ferrous metals	6	39	9	10	1	65
Non-ferrous foundries	15	42	6	4	—	67
Miscellaneous	8	46	7	8	—	69
Total	59	384	79	53	5	580

Table IV. Number of Weldors

Primary Metals Industries	Number of Employees 50-99	100-499	500-999	1,000-2,499	2,500+	Total
Blast furnaces, steel works and rolling mills	22	378	114	225	83	822
Iron and steel foundries	22	623	441	131	—	1,217
Primary smelting and refining of non-ferrous metals	—	111	72	130	—	313
Secondary smelting and refining of non-ferrous metals and alloys	—	35	15	58	—	108
Rolling, drawing and alloying of non-ferrous metals	7	134	61	65	—	267
Non-ferrous foundries	17	46	26	31	—	120
Miscellaneous	11	200	16	40	—	267
Total	80	1,526	745	680	83	3,114



1 PIE SEGMENTS were cut from each opening, and then the circle cut was made around the centerpunched boundary. A 45-deg bevel was made around the hole. Cutting was done with an electrode having a metallic core

Metal-Arc Cutting o

A big pressure sewage system installation in the midwest appeared headed for a long delay for want of five cast-iron pipe crosses. The contractor made them himself by using arc cutting and welding

BY A. C. LARWETH

ARC CUTTING combined with arc welding solved the difficult problem of converting five large cast-iron sewage pipe tees into pipe crosses. The contractor, Charles M. Porter Co., Maywood, Ill., had to have the five 16 x 16 in. by 8 x 8 in. crosses within six days. All he had to work with were five tees 16 x 16 in. by 8 in. Could they be converted into crosses by the expedient of cutting an 8-in. hole in the 1¼-in. wall of the 16-in. pipe and welding a short length of 8-in. pipe in place opposite the existing 8-in. opening for the small pipe of the tee?

METAL-ARC CUTTING

The cutting was successfully done with an arc-cutting electrode consisting of a metallic core surrounded by an exothermic coating that focuses and intensifies the energy of the arc. Operating on conventional low-voltage a-c or d-c welders without auxiliary oxygen, this electrode is struck like a match against a piece of plate and then pushed through it. It is capable of piercing a 1-in. plate within two seconds and can be used for cutting, gouging and chamfering. Steel, cast iron, bronze and other metals may be cut by this method, said to deliver a heat of 4,000 F through the ⅛-in. core of the electrode.

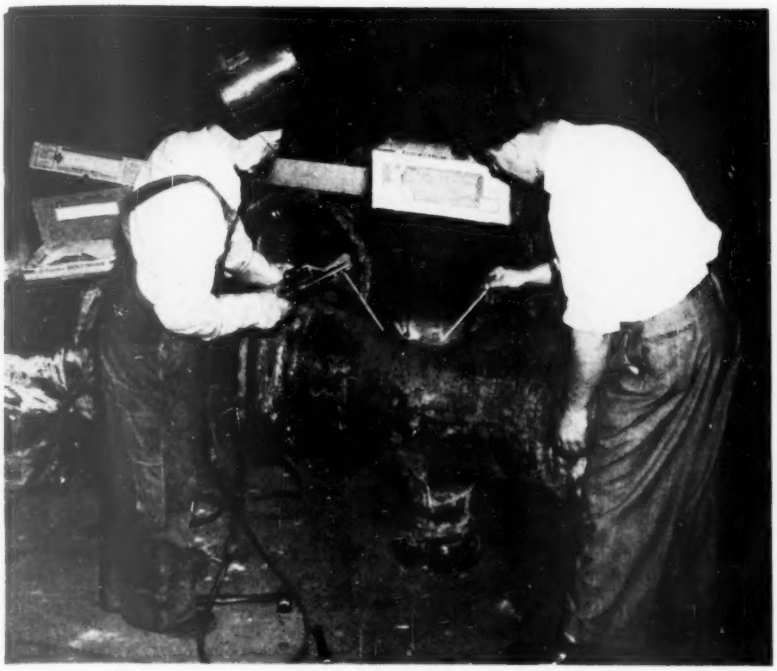
At the beginning, the job looked virtually impossible. The heavily rusted pipe walls were 1¼-in.-thick cast iron. Each tee weighed over 600 lb. Preheating would not be possible for either the cutting or welding operations. Previous experience with such pipes had shown that many of them cracked when cut with torches. If torch cutting could be done at all, it would certainly prove costly.

In a series of tests, lasting less than an hour, it was proved that the special metal-arc cutting electrode previously described would be capable of making the desired cuts. Hence a telegram was dispatched ordering the necessary supply of 3/16 and ¼-in. electrodes. The order was shipped on the same day and received four days afterward, giving us just two days to complete the crosses before the deadline.

CUTTING PROCEDURE

Circles for the cuts were laid out and centerpunched. Next a 2-in. pilot hole was cut in the center of each circle, using a ¼-in. metal-arc cutting electrode. Each pilot hole was cut in less than a minute and less than one electrode was used for each. Immediately after the pilot hole had been cut, the casting was cool enough to be touched with bare hands.

When the five pilot holes had been completed, 3-in. cuts were made from the edge of the pilot hole to the inner



2 BEVELS WERE filled in with a high-tensile ferrous electrode to produce a high-strength weld at the base. These welds were made without preheat

g of Cast Iron

edge of the punched circle—just as you would cut a pie into quarters. Two cuts were made on each casting to allow time for cooling between cuts. When all the pie segments had been cut, a circle was described on the centerpunched circumference and a perfect 8-in. hole was the result. Final operation was to make a 45-deg bevel around the hole to facilitate welding of the cast-iron pipe insert. The edges of the bevel were ground down slightly before welding.

3 FINAL PASS on each weld was made with a nickel-alloy electrode to provide a smooth, dense surface that would insure a leakproof seal

Welding at Low Temperatures

The inserted piece of 8-in. cast-iron pipe had a wall thickness of about 3/16 in. To insure that the welds joining it to the 1¼-in.-walled pipe would be of high strength and leakproof, two different types of low-temperature electrodes were employed.

For the heavy base welds, we made use of a high-tensile ferrous alloy in 5/32 and 3/16 in. sizes. This is a d-c reverse polarity electrode adaptable to low-alloy steels and cast iron. It produces a deposit with a tensile strength of around 75,000 psi and 200 Brinell hardness.

When the bevel had been almost completely filled in, we switched to the second type of electrode, a 5/32-in. nickel-alloy rod, for the final pass in order to eliminate any possibility of cross checking or leaking in the weld area. The second electrode welds at such a low base-metal heat that there is no danger of distortion or cracking. It operates on either a-c or d-c reverse polarity and produces a dense deposit of 50,000 psi tensile strength and 150-200 Brinell hardness.

The weldor worked on two castings alternately to allow cooling between passes.

Savings Effected

All of the crosses were finished and waiting, right on schedule, when the work crews needed them. It's impossible to compute the exact savings resulting to the contractor from this metal-arc welding and cutting combination, but they were definitely worthwhile. Total cost for each conversion was less than $50, and this figure includes the ten hours of layout, welding labor and the cost of the 8-in. pipe insert. New castings would have cost $100 each, but this comparison fails to tell the whole story.

New crosses, if they could have been obtained at all, would have been delivered at a very uncertain date in the future. By having the necessary number of crosses completed and ready for installation in the sewer line, a costly, time-consuming work stoppage was avoided.

Photos courtesy Eutectic Welding Alloys Corp.

1—HEATER FRONTS are subassembled on this jig. A push gun is used to weld the shields, stiffeners and corner gussets to the fronts of Ivanhoe 2150 heaters. A small scissors gun is used to weld shields, etc., on the side panels

2—MERRY-GO-ROUND on rollers and track for final assembly. A heater front is being positioned

Stoves Fabricated b

Oil-burning home heaters manufactured at Perfection Stove Co. were designed specifically for resistance welding. Rocker-arm and press welders, welding guns and seam welders are all needed on this job

BY ROBERT C. GLATZ

Production Engineer,
Perfection Stove Co.

MODERN is the word for welding techniques as practiced at Perfection Stove Co., Cleveland. Of the 33 resistance-welding machines now in operation at the company's Platt Avenue plant, 60% were purchased since 1940.

These machines range in capacity from 30 to 250 kva and include press, rocker arm, seam, gun and some special types.

The increase in resistance welding is due to the new trend, endorsed by the company's engineering department. Engineering and production planning departments work together in determining when and where spot or multiple-projection welding can be used to advantage.

Welding of heater casings offers a good example of the methods used at Perfection Stove Co. For the subassembly of small parts such as doors, shutters and lighting tube covers, a standard machine of either the press or rocker-arm type is used with a simple jig for locating of the parts. The operator positions the jig over the electrodes and completes the welding. In many instances, air-operated machines with adjustable and retractable strokes (which give proper clearance for loading and unloading of the parts) are used.

When the parts are too large to be taken to a standard welder, a special welding gun set-up is employed (see front cover).

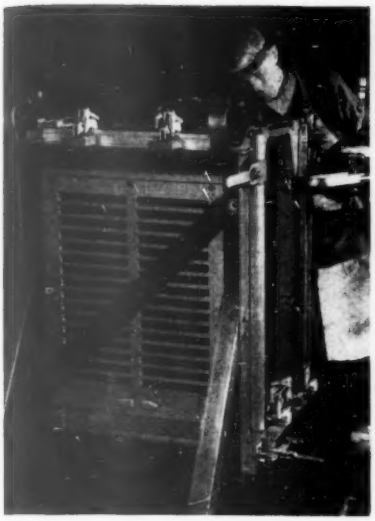
Housed in a building 60 by 100 ft, the heater casing welding department has seven 50-kva welding transformers with guns connected. There are also two standard motor-operated 40-kva press-type welders equipped with electronic contactors and timing. A stand-by transformer fitted with spare hoses, cables, etc., reduces losses of time due to breakdowns.

Two Lines of Heaters

The guns and other heater welding equipment were purchased and selected for use on heaters of specific series. Thus equipment is laid out in two sections: one for the 3100 Perfection heater series and the other for the 2100 Ivanhoe heater series.

For welding 2100 heater series, the company has four 50-kva transformers. The Ivanhoe 2150 heater uses all four, but the smaller 2130 heater requires only two since its subassemblies can better be welded on a standard welder than with a push gun. On the 2150 Ivanhoe, a small scissors gun is used to weld the shields and top panels to the side panels. A push gun is also used to weld the shields, stiffeners and corner gussets to the fronts (Fig. 1) and backs.

Assembly of the 2130 and 2150 heaters is accomplished by two guns hung on a curved I-beam track with two reel units to move them. These guns are in fixed positions on long



3—FINAL WELDING on casing of heater is done at this station by means of a portable welding gun

4—GRINDING out the defects in a heater casing is done with disc sander mounted in portable grinder

5—SUBASSEMBLY and subwelding jigs are mounted on tables placed at heights convenient for working

d by Resistance Welding

extension arms so that the operator can readily reach the bottom of the jig. They are connected to the same transformer and have an interlock so that the second gun will not fire while the operator is using the first. The jigs are mounted on swivel plates so that the operator does not have to walk around the jig. When shifting from one heater model to the other, the only change required is that of the jig.

The same guns and equipment are used for the three models in the 3100 series of Perfection heaters. The only changes required are the switching of jigs on the track and the changing of gauges and pins on the push-gun tables. One transformer and push gun serve two tables: one for the fronts, the other for the backs. While the operator is welding on one table, the helper is loading the other.

Welding Merry-Go-Round

From this station the parts go to a sort of merry-go-round where the final welding is done. Two identical jigs are mounted on a circular track (Fig. 2) having three stations. Two of these stations are for welding and one for loading and unloading. Air lifts are used to bring the jig to working height.

At the first welding station, two guns are hung from one transformer and controlled by an interlock. In the second station (Fig. 3) the casing is completed with the use of another gun.

The completely welded heater is now sent on to the finishing department. Using disc sanders mounted in portable grinders, the welds are finished off so smoothly as to become indistinguishable from the parent metal. The finished casing is then inspected and sent to the finishing department to be sprayed with a heat-resisting paint.

Perfection's new stainless-steel burner bowls are of seam-welded design instead of the older drawn type. A special seam welder clamps and welds the body seam without the use of a tack weld. When press work has been completed on the tops and bottoms, they are seam welded to the bodies. The lower arm of the welder is so designed that the operator can weld both the top and bottom of the bowl in a single set-up and with only one handling of the part

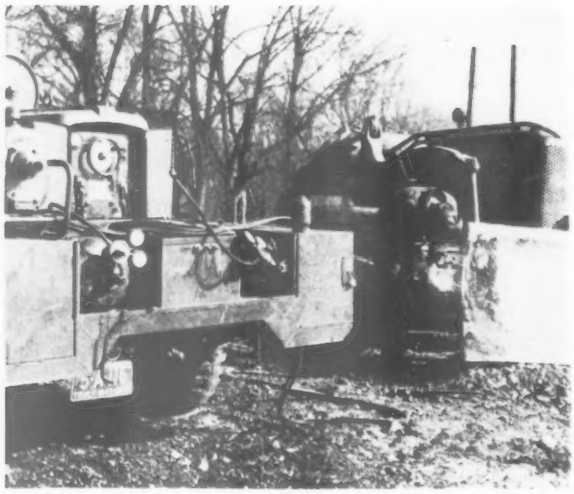
Perfection has given a lot of thought to improving working conditions for its employees. Even in the moving of stock, labor-saving devices have been introduced. Electric transporters move all stock; the operator merely has to push a button and steer in order to transport a load from place to place.

Elevated by Air

Subassembly and subwelding jigs are mounted on tables placed at convenient heights (Fig. 5) to eliminate stooping and bending. Welding jigs are mounted on track turntables that are moved up and down by means of air lifts. Guns are spring-suspended from the ceiling for easy handling. Sliding of assembled units from assembly to inspection is facilitated by a steel runway placed on the floor.

Modern welding equipment has paid off for Perfection in increased efficiency. Ever since the new lines of Perfection and Ivanhoe oil-burning home heaters were announced—in the company's 60th anniversary year—the heater welding division has been kept humming to supply the demand from all parts of the country.

1—FLAME-CUTTING to vee out broken tractor slide. Full-size oxygen and acetylene cylinders are carried.



2—WELDING the broken slide. Power for grinding the weld is also furnished from the welder-power unit

3—DERRICK at front of Repairmobile is called upon almost daily. Here it is being used to load timber

4—WATER PUMP comes in very handy on any construction job. It is also operated by an electric motor

5—GREASE PUMP is used to grease this gravel plant regularly, pressure furnished by the air compressor

6—AIR COMPRESSOR inflates the enormous tires of a scraper. Compressor also is powered electrically

Repairmobile

Service and repair of tractors and other heavy earth movers calls for much equipment. How to build a compact portable repair and service rig that will transport everything you need is told here

BY STERLING DANGLER
Maintenance Boss, Westbrook Land and Improvement Co., Troy, O.

WITH five construction jobs going on at one time in different locations, part of our equipment was busy on a new 18-hole municipal golf course, some on a winter sports building, some on a 20-acre development plat for new homes, while still other machines were scattered around elsewhere. It was a tough job to see that all of it was serviced regularly and kept in good repair.

Plan Portable Rig

When the construction superintendent told me to do something about the situation, I designed a portable service rig that we could take right out to the job. This "Repairmobile" was built upon a Dodge truck, to which I added everything that we would need to service and repair all types of heavy construction machinery.

We began by marking off a space on the floor of the service shop to correspond to the plan of the truck. As each piece of maintenance equipment was received, it was placed in a tentative position. Not until everything was at hand, did we start to assemble equipment on the truck.

Electric power was, of course, indispensable. At first I decided that the nucleous of the Repairmobile should be a power plant. But a still better idea developed—to install a combination gasoline-engine-driven a-c arc welder and a-c power unit. This compact outfit would save us considerable space for other equipment.

The 300-amp arc welder and 8-kw power unit was placed in the exact center of the marked-off space on the service shop floor. Along the right side of this unit, we placed an acetylene tank horizontally and along the left side an oxygen tank horizontally. An electric-motor-driven air compressor was located directly in front of the welder-and-power unit.

Badly needed were tool boxes to hold the portable electric tools and hand tools required for repair and servicing. To provide this storage, we removed the back fenders of the truck and covered each rear wheel with a steel boxlike affair that could be used as a tool chest. These were welded to the back edge of the running boards and to the bed of the truck. The space left for tool boxes measured 15½ in. wide, 17⅝ in. high and 23½ in. deep. The full-length running boards were left intact to provide space for grease drums, two on each side of the truck.

On top of the left fender we mounted two hose reels: one to be used for air and the other for grease. The back part of the left fender supported a 1½-in. electric water pump. Two hose reels, both to be used for grease, were also mounted on top of the right fender. Over the air compressor, a rack was built to hold two cable reels: one reel holding the electrode and ground cables for arc welding, and the other the power cable for operating tools, equipment and electric lights.

Adding a Derrick

A derrick would be useful to lift motor blocks from trucks and to do other lifting jobs on the various projects. We made one by building an A-frame from 14-ft lengths of 3-in. pipe. The pulley was fastened to the closed end of the A-frame; the pipe at the open end is fastened to the front bumper with pins. The power winch of the truck is used to elevate the derrick to the proper height, and it is then held in lifting position by guy wires fastened to the rear of the truck. When not in use, the derrick is disassembled and carried underneath the running board. Any lifting job within the capacity of the A-frame can be performed by the power winch and derrick.

The Repairmobile's list of equipment reads like the inventory of a well-equipped stationary repair and service shop. It includes a combination 300-amp a-c arc welder and 8-kw a-c power unit; an oxyacetylene welding and cutting outfit; a 7-cu ft electric air compressor, a 1½-in. electric water pump, a ¾-in. electric drill, a portable electric grinder, an electric chain saw, four high-pressure barrel pumps for greasing, three grease hose reels, an air hose reel, a welding electrode and ground cable reel, a power cable reel and tools such as jacks, wrenches, etc.

On the Job

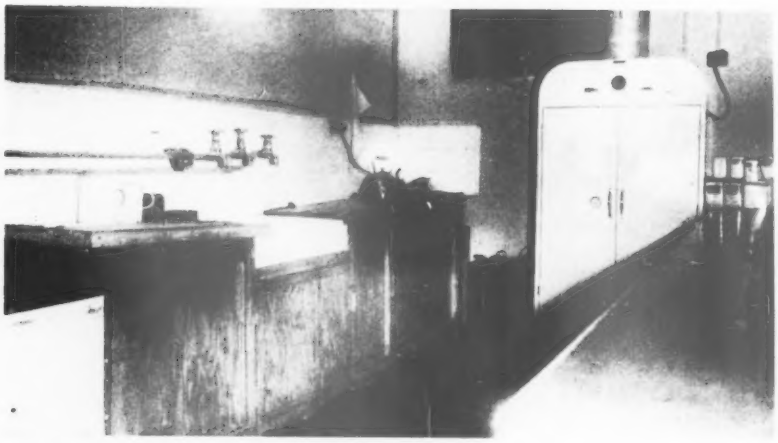
Applications of the Repairmobile are so many that it is scarcely possible to list all of them. The most typical will be found in the accompanying illustrations*. In Fig. 1, a break in the slide of an International TD-18 tractor is being veed out with the oxyacetylene torch in preparation for repair by arc welding. The arc-welded repair is shown in Fig. 2. The combination welder-power unit also furnished current to the portable electric grinder used to finish off the weld.

Hardly a day goes by that the derrick on the front of the Repairmobile isn't called upon to do some lifting job. In Fig. 3, it is being used to load timber on a truck. The timber was cut down by the electric chain saw, which is much lighter than a gasoline-engine-driven saw and correspondingly easier to handle.

The electric-driven water pump (Fig. 4) comes in very handy on many construction jobs. Its motor, like those of the chain saw and portable grinder, is operated by current from the combination welder-power unit. In Fig. 5, a Cedar Rapids gravel plant is being greased by a high-pressure barrel pump with pressure supplied from the air compressor. The compressor is also driven by an electric motor powered from the welder-power unit. Another purpose for which it is handy is to inflate large tires such as those of the Bucyrus-Erie scraper in Fig. 6.

For servicing and repairing heavy earth-moving equipment on the job, I don't see how you can beat the Repairmobile.

*Photos courtesy The Hobart Bros. Co.

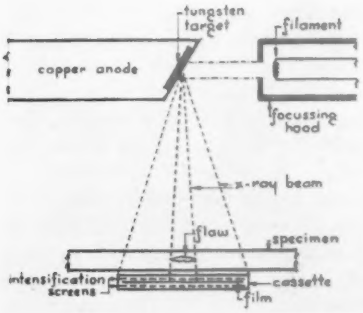


1—DARKROOM of British radiographical laboratory, Chatham, showing wet bench and sink, dry bench for loading cassettes and film drying cabinet

2—ANOTHER VIEW of darkroom, showing the film developing unit

British Radiographic L

3—PERMANENTLY installed X-ray set, range 250 to 400 kvp. This model is operated by remote control behind 14-in. concrete walls



5—SCHEMATIC diagram of X-ray tube, specimen and film. Target area should be kept small to provide a "point source" for the rays

Naval construction department of the British Admiralty operates a completely outfitted radiographic laboratory at Chatham dockyard, including equipment which can be carried on board naval vessels

BY A. WILSON*

IN THE PAST the radiography of welding was carried out in British dockyards and shipyards by mobile equipment operating from vans. Each van contained a darkroom for developing films and storage space for the X-ray set when it was being transported. To meet the increasing demand for radiography, it was decided to construct permanent laboratories in various parts of Great Britain. The first was built in Chatham dockyard, the plans being drawn by the naval construction department's radiography section in conjunction with various shipyards departments. The writer feels that a brief description will have much to interest American readers.

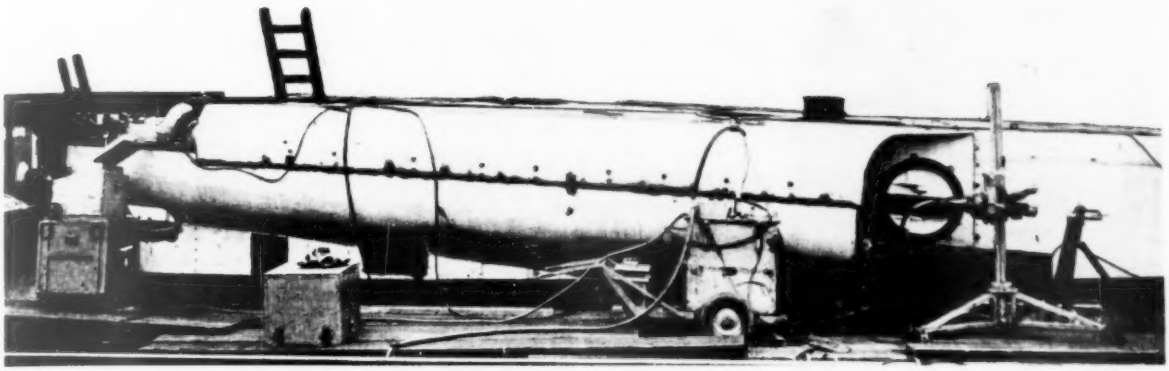
Constructional Details

First, the staff operating the X-ray equipment is adequately protected behind 14-in. walls of concrete. In order to obtain a material of suitable density to absorb the X-radiation, a mixture comprising 1 part of cement, 2 parts sand and 2 parts rubble was chosen, although this is not structurally the best concrete. Originally, no fittings were allowed to be grouted into the wall to a depth of more than 3 in. An exception had to be made for the conduits carrying the control cables of the 400-kvp set, but these conduits were installed at such an angle that the net thickness of wall between the control room and the X-ray beam is of the order of 14 in.

Both entrances to the X-ray room are protected by specially constructed lead-lined sliding doors. The door to the control room is fitted with a lead-glass window to enable sets to be observed while in use. As a further safety measure, all doors are fitted with interlock switches and relays which prevent the operation of the X-ray sets while any of the doors is open. Even the main doors, weighing about 1,120 lb each, can be opened by one person.

The darkroom is reached by a labyrinth, the floor of which is set

* The author joined the radiography section of the naval construction department of the British Admiralty in 1944, on loan from the post office engineering department. After an intensive training as a radiographer, he spent some months carrying out radiographic examinations of welding in various shipyards engaged on Admiralty contracts. He was for some time radiographer-in-charge of the laboratory described in this article.



4—SHIPBOARD set-up of portable X-ray set. Note mounting stand

c Lab

with white tiles to enable the center path to be followed quite easily. The darkroom itself is divided into a wet side for the developing unit, sink draining boards, etc., and a dry side for film storage and cassette loading. Fig. 1 shows these benches and the film drying cabinet; Fig. 2 the film developing unit.

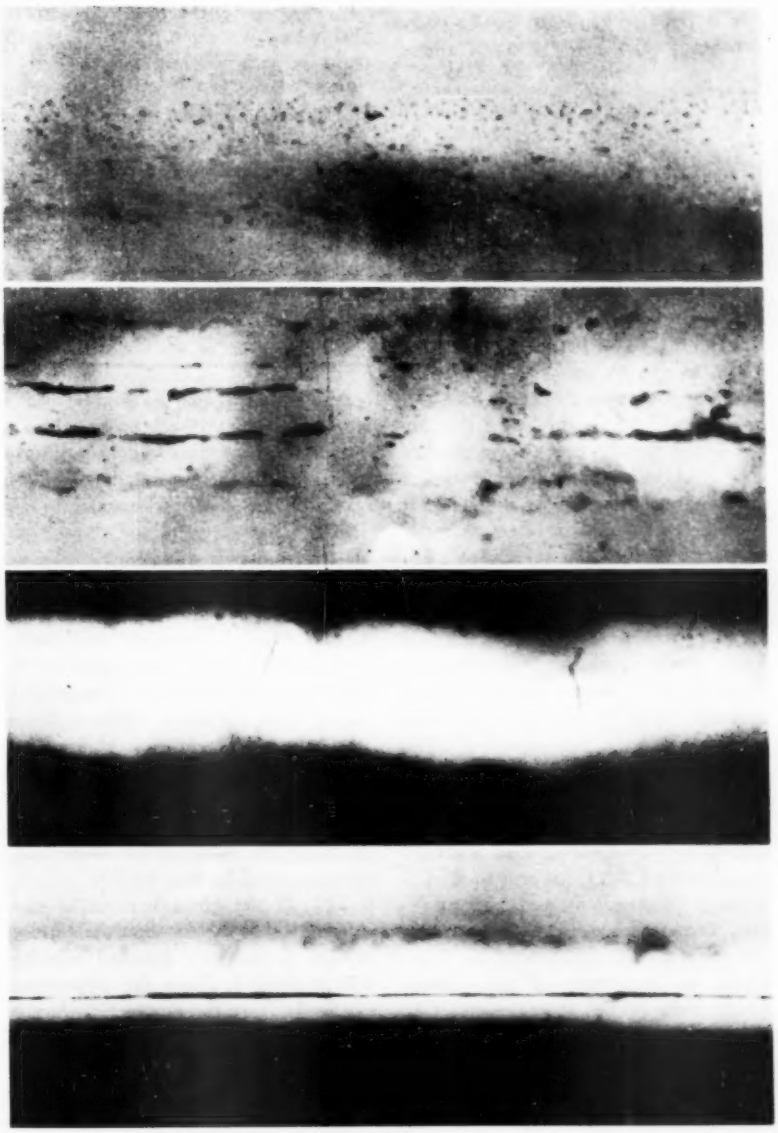
There is also a control room to house the control panels of the sets.

X-ray Equipment

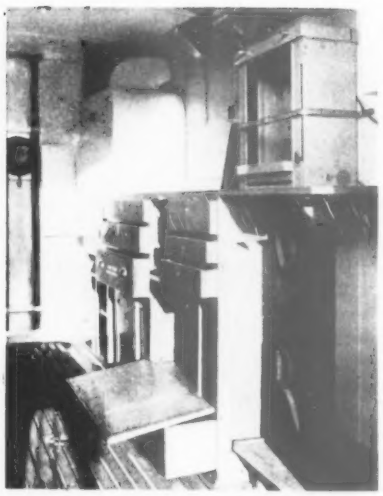
At present three sets are in use at Chatham: the 250 to 400 kvp set, illustrated in Fig. 3, which is permanently installed in the laboratory, a 60 to 250 kvp set and a 60 to 150 kvp set. The kilovolt-potential figures denote the usual working range of the sets. The two smaller sets are mounted on special stands (Fig. 4), enabling them to be used on board ships and in the various shipyard departments.

With this range of sets, it is possible to carry out radiography upon metallic specimens of up to 3½-in. thickness, keeping within a maximum exposure time of 1 hour. Normal routine exposures on thinner sections are made with an exposure of about five minutes, depending upon types of film, intensification screens and film-focus distances employed.

A typical industrial X-ray tube, shown schematically in Fig. 5, con-



6—FLAWS IN THE WORK will usually appear as dark areas in the film. These four typical radiographs show, top to bottom: general scattered porosity; parallel lines of slag and slight side under-cutting; transverse cracking; a lack of penetration (heavy longitudinal line) along the weld



7—MOBILE X-RAY laboratory can be transported on a 5-ton truck

sists of a large pure-copper anode (in which is set a tungsten target) and a hot-filament cathode. The electrons emitted by the cathode are drawn across to the anode by the large potential difference maintained between the two and strike the tungsten target to cause the emission of X-rays. By mounting the target at a suitable angle, the X-ray beam is directed at right angles to the electron stream and the projected target area is kept very small. It is important that the projected area be kept to a minimum. For maximum radiographic definition, a point source is desirable to reduce the penumbra effect as much as possible.

Fault Detection

That part of the film which has been acted upon by rays passing through the fault appears darker, assuming that the flaw is of a lower density than the parent metal. The shadow formations obtained are typical for each type of fault encountered. So that the position of the defects can be located, lead markers are placed on the front and back surfaces of the specimen under examination, and stereoscopic shots are taken with a source shift of 4 in. to 6 in. From an inspection of the stereoscopic pair in the stereoscope, it is possible to determine the position of a defect with reasonable accuracy.

Typical radiographs of such welding flaws as porosity, lines of slag, transverse cracks and lack of penetration are shown in Fig. 6.

Since the Chatham laboratory opened in June, 1946, it has been mainly engaged on X-ray work, though gamma-ray examinations form part of its service. It is also intended to develop the use of supersonic and magnetic deep fault detection methods. At present, the laboratory is fulfilling a necessary function in assisting the development of welding techniques and the maintenance of a good standard of welding in the dockyard. It is also assisting the foundry in the study of casting techniques.

Mobile Laboratory

The use of sets on board ships is facilitated by a mobile container fitted with darkroom equipment (Fig. 7). The complete unit weighs in the region of 3 tons 10 cwts (7,840 lb) and is satisfactorily transported on a flat 5-ton truck. This traveling darkroom enables films to be developed on the site, where otherwise a large amount of time would be wasted in walking to and from the laboratory.

RADIO INTERFERENCE

(Continued from page 37)

operator is ready to weld, and it should be turned off as soon as he has finished welding. The use of automatic circuits is recommended.

When installed according to the instructions given in the paragraphs above, most installations will not cause radio interference. However, there will be a few special cases where radio interference will occur and further steps may have to be taken to eliminate it. Proceed in order with the steps outlined below until the interference is cleared up. In some cases only the first few steps of the following will have to be taken:

(1) Make a quick check to determine if the interference is actually being caused by the welder.

(2) If the plant wire is in conduit, check to be sure that the conduit system is properly bonded together and grounded. Place the power-supply leads from the connection box to the welder primary in a shield and bond the shield to the connection box and transformer case. If there are any exposed wires within 50 ft of the welding leads, shield or change the location of these wires.

(3) If the plant wiring is not in conduit, shield or change the location of all unshielded wiring for a distance of 50 ft from the welding leads. This includes telephone, lighting, control and signal wiring as well as power wiring.

(4) Where the plant wiring is not in conduit and, for some reason, cannot be placed in conduit or other forms of shielding, install a spaced filter.

(5) Where the wiring is in conduit or has been shielded and the previous steps have reduced but not eliminated the interference, the addition of a spaced filter may eliminate the remainder. Proceed as below:

(*a*) Where the plant wiring is all in conduit, place the spaced filter in the incoming power line immediately following the meter and the incoming switchgear. This assumes that the plant is small, that the total power requirements are low enough to make possible a practical size of filter coil and that the incoming power is not more than 440 volts a-c. In a larger plant, place the filter in the branch feeder line to the welders. Where several welders are on the same feeder line, one filter will serve for all of them.

(*b*) Where the plant wiring is not in conduit and the wiring has been shielded in accordance with instructions try a spaced filter both at the end of the shielding and at the incoming power line immediately after the meter and switchgear. Note: where the incoming power line is three-phase and where the filter is located near the meter, insert another condenser and coil in the third wire and connect in the same manner as the other two legs.

Short-Wave Interference

In most cases, the interference will be in the broadcast band (0.550 to 1.6 megacycles) or in frequencies near that region. In some cases, however, interference may be caused on high frequencies and with important services such as police, aviation or navigational short waves. This type of interference is usually caused by harmonic or spurious frequencies and is best handled by means of an absorption circuit such as shown in Fig. 8. If the frequency of the service which is being interfered with is appreciably higher or lower than the fundamental frequency of the spark-gap oscillator, use the absorption circuit as previously directed.

Electric Locomotives for Brazil

Locomotives have to be good to stand the jolts, strains and wrenches they receive in the mountainous state of Sao Paulo, southern Brazil. Hence the Paulista locomotives are of rugged welded construction

BY K. P. O'KELLY

Apparatus Work Laboratory, General Electric Co., Erie, Pa.

LAST welded electric locomotive of an order for the Paulista Railway of Brazil was recently shipped from the General Electric Company's Erie Works. The "Paulista," as the locomotive is popularly called, was first described in THE WELDING ENGINEER for February, 1941. These locomotives were designed for 3,000-volt d-c operation in road service through mountainous territory.

Total weight of each is 364,000 lb, of which 270,000 lb is on the drivers. Identical operating cabs at either end enable the locomotive to be used either singly or in multiple units and for double-end operation. At each end are air-raised, gravity-lowered pantographs for collecting current from the overhead. Six traction motors, mounted on the six driving axles, take their power directly from the overhead. The truck arrangement consists of two-axle guiding trucks on either end and two articulated three-axle driving trucks, all of fabricated construction. Overall length of the locomotive is 75 ft., knuckle to knuckle.

Welding was a major operation in the production processes. One locomotive required nearly 3,200 lb of electrodes and more than 5,600 man-hours of welding for its fabrication. The severity of service demanded welded joints able to stand up under the jarring, straining, wrenching to which the locomotive is subjected.

Underframe Construction

The cab underframe platform spans the trucks and provides the base upon which the superstructure, auxiliary machines, control equipment and operating stations are mounted. It, in turn, rests through its integral center plates upon the female center plates of the trucks.

Construction of the underframe began by leveling two 21½-in. I-beams, 70 ft long, and clamping them to a steel block floor. Between these main sills were placed cross ties (Fig. 1), also 21½-in. I-beams. There are two cross ties near either end and one in the center, all welded in place with ¾-in. fillet welds using ¼-in. E-6020 electrodes. This framing constitutes the principle tie-in of the sills, though various channels and angles were also welded between them to provide framing for air ducts, floor supports and other compartments.

The framework for the aisle floors provides the base upon which the side trusses and side sheets of the apparatus cab were welded. This framework is part of the underframe construction and consists of 10-in. I-beams (called needle beams) at a spacing of about one every 4 ft. These were welded to the sills at right angles to them and on the lower portion (at floor level). E-6020, ¼-in. electrodes were used for the ¼-in. fillet welds. To the ends of the needle beams were welded 10-in. channels to form the contour of the sides of the locomotive. Floor-support angles (2 by 2 by ¼ in.) were welded between each needle beam to the sills with ¼-in. intermittent fillet welds—2 in. of weld at 6-in. centers. Aisle checkerplate (¼ in.) was welded to the top sides of the aisle floor support framework with ¼-in. intermittent fillet welds, 2 in. in length on 8-in. centers.

The end counter was made by welding 4-in. channels (formed to a semicircular shape) to the ends of the main sills. Deck plates ½ in. thick were welded on top of the main sills to provide flooring for the apparatus and to brace further the

1—CROSS TIES being welded to sill beams (both 21½-in. I-beams) to frame platform of 182-ton locomotive for the Paulista Railway

platform structure. The deck plates were welded with ¼-in. fillet welds, using E-6010 electrodes. Bolster plates, 1 in. thick, were welded to the underside of the assembly on the 21½-in. I-beam cross ties near each end with ¾-in. fillet welds, using E-6020 electrodes. At this point the assembly was turned over to allow horizontal-position welding.

Center Plates Added

Plates centered at the longitudinal centerline of locomotive and the centerlines of the bolster plates were welded in place with 1-in. fillet welds using ½-in. E-6020 electrodes. These center plates were first sub-assembled with wearing bands around the outer circumference and wearing plates ⅜ in. thick on the flat surface. The latter are of high-carbon steel (SAE 1045) and were welded to the mild steel with stainless-steel electrodes.

It was necessary to allow ¾ in. for overall shrinkage of the underframe from end to end. This shrinkage is not unusual for such structures. Some larger platforms of a similar type require more than 1½ in. shrinkage allowance. Approximately 60% of the welding on the underframe was horizontal fillet welding, 35% vertical and 5% overhead.

A total of 600 lb of E-6010 electrodes and 400 lb of E-6020 electrodes were used in the fabrication of the underframe. Fillet welds of

2—WOODEN MOCK-UP for forming nose of the locomotive. The fourteen 0.109-in. steel sheets comprising the nose were tack welded together on this mock-up

3—NOSE and operator's cab were mounted at each end of the central apparatus cab. The operator is welding the engineer's seat with 5/32-in. E-6012 electrodes

1/8, 3/16, 1/4, 3/8, 1/2, 3/4 and 1 in., plus several 1 1/4-in. plug welds, were necessary to complete the underframe. Commercial-quality rolled mild-steel plate was used, together with some SAE 1045 steel for wearing surfaces.

The entire cab is fastened together by arc welding. Upon the underframe platform, subassemblies were mounted to complete the superstructure. The upper subassemblies were fabricated in the cab shop from standard structural-steel rolled shapes and plates. Plate material up to 3/8 in. thick was cut to shape by power shears, thicker material by means of flame-cutting.

Cab Fabrication

A framework of 4 and 6 in. channels, 3 by 2 in. angles, 6 by 3 1/2 in. angles and 3/16-in. plate formed in power presses was built up and welded together as a unit. Where necessary, components were straightened and trimmed before erection on the platform. To this framework, the side sheeting was intermittently welded, using E-6010 electrodes. The sides of the apparatus cab and the lower portion of the operator's cab overlap the channels of the underframe sides.

The nose of the cab front end was constructed by forming 14 individual mild-steel sheets of 0.109-in. thickness on a wooden mock-up (Fig. 2). (The operator's cab portion of the front end is made up of nine sheets.) After forming on the mock-up, these sheets were tack welded together. The assembly was then removed and welded inside and out with E-6010 electrodes, the welds being ground flush on the outside. This forming method is widely used in the manufacture of modern G-E streamlined locomotives because volume generally does not justify forming the sheets with a die.

Strengthening Ribs

Appropriate channels, steel plates and angles were welded inside the nose and operator's cab with 1/8 and 3/16 in. fillet welds, both intermittent and continuous. These ribs were rolled to the proper curvature before their assembly in the cab. Nose and operator's sections were then mounted and welded (Fig. 3) to each end of the previously mounted central apparatus cab.

In further assembly, a section was cut out of each nose for the headlight hood, previously rolled and hammered over dies. Louvres, to permit entrance of the air required for ventilation of the electrical apparatus, were built into frames as separate units. The hatch covers, also separate subassemblies, were bolted over the hatchways in the roof of the apparatus cab. Doors and window frames (Fig. 4) were bolted or welded in place. The front platforms were assembled from 3/16-in. "multigrip" floor plate and 1 1/2 by 1 1/2 by 1/4 in. angles and welded to each end of the locomotive cab.

In preparation for the installation of auxiliary machines, control compartment, etc., apparatus supports were welded to the deck with 1/4-in. fillet welds. These supports are designed to carry the apparatus under all conditions of service. The control compartment was welded to the deck; the motor-generator sets and blowers bolted to their respective supports. Because of space limitations and the question of accessibility, extensive layout studies had to be made to determine the correct location of each piece of apparatus (see plan, Fig. 6).

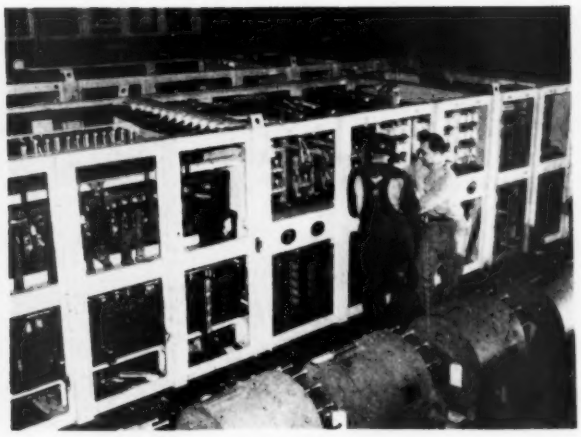
The control compartment contains a high-speed circuit breaker and various contactors, resistors, etc. These are supported by a structure (Fig. 5) made of 4, 5, 6, and 10 in. channels, 5/32 and 3/8 in. plate and 3 by 3 in. and 3 by 2 in. angles. Overall dimensions of the compartment are 14 ft long, 6 ft 5 in. wide and 5 ft 7 in. high. Some 250 ft of welds were needed to fabricate the rectangular framework and 215 lb of electrodes were consumed, practically all of 5/32-in. E-6010. Easy access to control equipment was an important consideration. Removable side covers and doors were separately fabricated.

After further assembly consisting of the installation (wiring, etc.) of the equipment, the compartment was lowered as a complete unit into the locomotive through the center hatchway and welded in place with intermittent 1/4-in. fillet welds.

Truck Frames

Trucks with integral welded frames are now widely accepted. The truck

4—FINISH WELDING WINDOW FRAME on the cab. Front platform, of 3/16-in. multigrip floor plate, has been welded at front end of the cab on extreme right



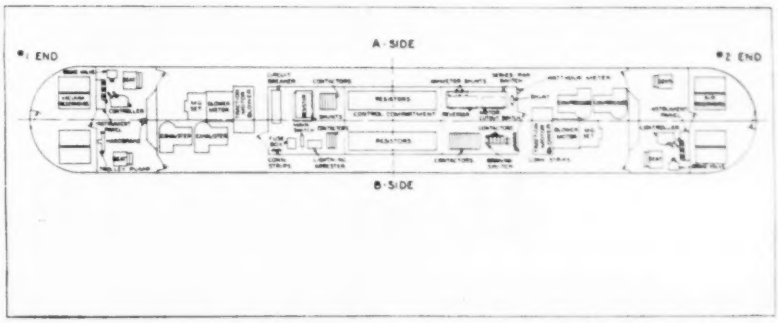
5—CONTROL COMPARTMENT structure was made by welding plate, channels and angles. With equipment installed, compartment was lowered into place as a unit

frames for the Paulista are the integral fabricated type. The trucks were built up of heavy commercial steel plate, and most shapes were cut with machine flame-cutting equipment. One set of trucks required 600 lb of ¼-in. E-6020 and E-6011 electrodes to weld ½, ⅝, ¾ and up to 1½ in. fillet welds. The welding totaled 250 ft on one set of trucks.

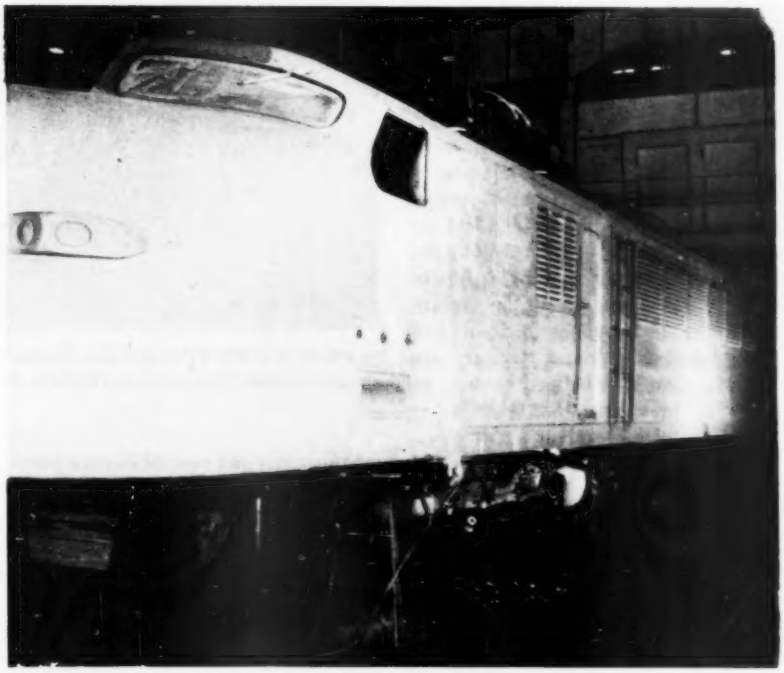
After fabrication had been completed, the truck frame was assembled with wheels, axles, journal boxes, springs, etc. The traction motors were also hung on each driving axle at this time. The mounting of an axle-hung railway motor must be especially rugged as any failure that resulted in dropping the motor on the track would probably derail the locomotive. All axle-hung motors have safety noses, and lugs were welded to the truck transom members to provide supports.

Since the 63-in. gauge of the Paulista Railway is wider than standard gauge, the assembled trucks were placed on special dollies. The cab and platform assembly with most of its equipment on board (Fig. 7) was then placed upon the trucks, which had been joined by special couplings. Piping was installed at this time, necessitating welding with special electrodes designed for high-pressure pipe lines. Little welding was necessary beyond this point.

In the construction of G-E locomotives, welding has been used for a number of years with excellent results. Pleasing appearance and remarkable stamina are outstanding features.



6—LOCATION OF APPARATUS is shown by the above plan. Extensive layout studies had to be made in order to determine the final arrangement



7—CAB AND PLATFORM assembly with most of the equipment on board. The operator is welding the ladder to the underside of the locomotive

12—SUCCESSFUL WELDING DISTRIBUTOR OPERATIONS

W. R. Garten's territory is the state of Indiana. His secret of business success is simple combination of service and square dealing. Hard work is necessary, too

BY CLYDE B. CLASON

W. R. GARTEN, president, Sutton-Garten Co., Indianapolis, began his career in 1915 by assembling gas welding and cutting torches at 18 cents per hour

Hoosier Distributor

SERVICE

"YOUR OWN TRUCKS are needed to give customers the service they require and expect," says Garten. He has six, including the above two at Fort Wayne

YEARS of square dealing are a distributor's best guarantee of a business future, thinks W. R. Garten, of Indianapolis. Garten is founder of the Sutton-Garten Co., which is this year celebrating its 31st anniversary as a welding distributor.

Sutton-Garten is located where Missouri meets Vermont. In Indianapolis that is at 401 W. Vermont St., four blocks north and four blocks west of the center of "the square mile," as Indianapolis citizens call their business section. Officers are W. R. Garten (better known as "Ray"), president; W. F. Garten ("Bill"), vice-president, and Mrs. W. R. Garten, secretary-treasurer. The business is thus a strictly family affair of man, wife and son, all of whom are active full-time workers.

Territory is the state of Indiana with the exceptions of the lake counties near Chicago and the southeast countries near Cincinnati. Headquarters are centrally located at Indianapolis, and branches at Fort Wayne and Richmond serve the northeastern and central eastern parts of the state. No effort is made to extend operations outside of Indiana. "Once it took eight states to make a living in the welding supply business," says Mr. Garten, "but now we can get along nicely without going more than 200 miles away from home."

A native-born Hoosier, Mr. Garten studied civil engineering at Purdue University and would have been a graduate in the class of 1914 had he not switched his allegiance to the University of Illinois and geology. When he received his bachelor of science degree in 1915, he was fully determined to make geology his life work. Unfortunately, there was nothing available in that line, and young scientists must live. He found work with the Presto-O-Lite Co., then

TODAY GARTEN owns the reinforced-concrete structure in the "square mile" of downtown Indianapolis, where he moved after fire gutted first quarters. Sutton-Garten Co. has also survived two burglaries, two bank failures

ENTIRE FRONT of Indianapolis salesroom is taken up by glass showcase. The 8-ft sailfish above door was caught by Garten on a Florida vacation.

a new concern in the welding gas and equipment field.

Early Training

Garten's first job was to assemble welding torches, of which Presto-O-Lite made a complete line. He was paid at the rate of 18 to 20 cents an hour and managed to earn between $10 and $11 a week. Eventually, he became an expert on the construction of welding and cutting torches. When Prest-O-Lite was purchased by Union Carbide & Carbon Corp. in 1917, Garten was transferred to Chicago, in charge of regulator repairs and purchases for the Prest-O-Lite division of the Oxweld Acetylene Co.

In December, 1918, Mr. Garten and his good friend, C. R. Sutton, sales manager of the Oxweld Prest-O-Lite Equipment division, organized a company to handle the distribution of Prest-O-Lite welding equipment, supplies and accessories for the state of Indiana. The name of the company as originally organized was the "Service Welding Apparatus and Supply Co.," but within six months after organization the name was changed to the present Sutton-Garten Co.

SALES

Each partner contributed $500, enabling the new enterprise to start operations with a total working capital of $1,000. A location was found at 425 North Capitol St. along "automobile row." This was the city's most heavily traveled street, and the rent was high—$175 a month, something of a load for the young business to carry.

Auto Supplies to Welding

The company's first letterhead reads: "Oxyacetylene welding equipment and supplies, expert welding and instruction service, automotive equipment." The latter included a wind deflector, which was sold in considerable volume before the partners realized that their true interest lay in the welding, not in the auto-

R. F. McNUTT is manager at Fort Wayne, serving northern Indiana

FORT WAYNE BRANCH is housed in this substantial brick building, has an office force of seven employees. Company also has a branch at Richmond

motive business. Garten organized the welding shop, which has continued as an integral part of the business. Earliest items handled were acetylene, oxygen, welding and cutting torches, pressure regulators and welding rods.

Every year found new prospects and a larger volume of business. The saturation point never did appear—it hasn't after 30 years. Even the big depression didn't alter the rule of more business; as far as volume was concerned, Sutton-Garten hardly realized that there was a depression.

In 1922 Mr. Garten purchased the interest of Mr. Sutton, and since that time the control and ownership of the company has been in the hands of the Garten family.

Arc Welding Introduced

About the time that Sutton retired, arrangements were made to work with the local representative of an arc welder manufacturer. Then a fledgling concern, this manufacturer is now one of the big names of the business. Garten takes pride that he personally sold the first arc welder ever purchased in Indianapolis; it went to the Central Indiana and Western Railroad for locomotive repairs.

In 1923 Sutton-Garten decided to plunge into arc welders and also add welding electrodes. Those early electrodes were plain bare wire; frequently no more than bailing wire. It took a great deal of skill to arc weld, and the results were often unpredictable. For these reasons, arc welding was only a trickle in the business stream until reliable coated electrodes appeared on the market.

It is interesting to note that an early 200-amp motor-generator set sold for $1,285 and had only half the efficiency of one of today's models. Three or four arc welder sales constituted a good year's business. The distributor's margin, however, was a healthy 25%.

As soon as the shielded-arc type of electrode began to be developed, arc welder sales increased rapidly. Contrary to the predictions of one enthusiast, however, they did not put gas welding out of business; instead, sales of oxyacetylene equipment also continued to grow. Garten's slogan was "Everything for the Weldor." He took on electrodes, helmets, face shields, goggles and other safety equipment including a full line of safety garments — gloves, mittens, aprons, sleeves, coats, leggings and spats. Fire extinguishers were likewise stocked.

Gradually, other items began to be added: Welding positioners, fume collectors, manganese applicator bars, wedge bars, weld-on plow points, acetylene generators and a very complete line of resistance spot welders. The latter include both manual and motor-operated types and are sold equipped with automatic weld timers.

Perhaps the business was growing too rapidly to suit the jealous gods, for in 1927 disaster smote swiftly. The store on Capitol Street went up in flames, some 150 oxygen and acetylene tanks producing a blaze that flared like a nova in downtown Indianapolis. The premises were completely gutted and all stock destroyed. The insurance company haggled about settling and did not, in fact, pay up for two years.

Garten was never a quitter. He found another place of business about six blocks away—larger quarters at the same rent. Such is the value of an established credit standing that practically every manufacturer with whom he did business wrote to say he could have credit for a new stock to whatever amount he wanted and on his own terms. Customers flocked to the new location, and volume was back to normal within two months.

In 1929 Garten felt justified in fulfilling a long cherished dream. He purchased a lot well inside the "square mile" and called in architect and contractor to put up a reinforced-concrete structure that would be wholly fireproof. This building was marked by many innovations: sealed glass-brick windows and a ventilating system to bring in fresh air from the roof. A fluorescent lighting system was later installed.

Between Banks and Burglars

Shortly after the Gartens had moved into their handsome new quarters, they were hit by one of the

early bank failures of the depression. With all the cash he possessed in the world tied up, Garten began once more the painful process of starting all over again. By working harder than ever, he managed to make up the lost funds; then he was caught by a second bank failure, three years after the first one. This time, however, he had been lucky enough to have half of his cash in a safety deposit box when the crash came.

As if fire and bank failures were not enough, burglars visited the store. Coolly borrowing an oxyacetylene cutting outfit from the shop, they cut off the entire door of the safe. Garten bought a new safe; the night after it was delivered the burglars came again. Garten gave up. He welded back the two doors of the damaged safes, cut off their locks and painted their fronts with large red letters saying "Records Only." Since then he has been left alone by burglars.

In spite of all misfortunes, nothing could stop the growth of the business. Today the annual sales volume is many times what it was ten years ago. On the other hand, it has become necessary to carry a very heavy inventory of arc welders and electrodes in order to give the customer the best possible service. Also, a very large stock of rental equipment of both arc and gas is carried for the benefit of those who need to rent extra equipment.

Sales Force

Sutton-Garten Co. has a payroll of approximately twenty employees, all specially trained to give the customer the best possible service. It employs welding engineers who are in position to tell any prospect what particular kind of electrode he should use to do a certain job, and, what is more, are able to tell him the best way to do the job, whether arc or gas. Inert-arc welding equipment, motor-generator sets and gas-engine driven units are available in the company's large repair shop for both inside and outside commercial work. As many as eight and ten men have been employed in this shop, doing customers' work only.

Usually two salesmen are employed for Indianapolis and adjacent territory; recently, however, it has been practically impossible to find men who know the business and are able to sell. For that reason, most of the sales work has been done by Mr. Garten, and his son Bill. Bill Garten is an engineering graduate from Purdue in the class of 1939 and has had a lot of experience in the welding field. When he was only a boy six years old, he was taught to operate a welding torch in the welding department of his father's business. L. G. Lynch is also a junior salesman working out of the Indianapolis office.

The Fort Wayne branch of Sutton-Garten is managed by Russell F. McNutt, who has spent some 25 years in the welding equipment and gas business. Mr. McNutt is assisted by D. B. Rice, who has had many years of practical welding experience and is well qualified to serve his customers in that territory. The territory of the Fort Wayne branch is Fort Wayne and the surrounding area for a distance of about 75 miles. This branch was opened in August, 1946, and is already doing a very nice volume of business. Like the main office, it has built itself a reputation for supplying "Everything for the Weldor" and being able to give the weldor that information which he desires.

In April, 1948, the Sutton-Garten Co. opened a branch in Richmond, Ind., carrying a very complete line of arc and gas welding supplies and accessories. Harry Sterling is the manager of this Richmond branch, and its territory is Richmond and adjacent area for about a 50-mile radius.

Garten's biggest business problem is to secure the right type of men for his sales force. "I believe we could double our business if we could find the men," he says. "Right now I could put on two more men if I had them."

The ideal salesman, thinks Garten, should be a technical engineering graduate such as his son, Bill Garten, however, is one of the comparatively few engineers who have selling personalities. Since the engineer-salesman combination is so rare, Garten has tried to take weldors from the shop and teach them to sell. Once in a while this works out, but in general it is easier to teach a salesman to weld than to teach a weldor to sell.

When a new salesman is hired, he puts on overalls and goes to work in the welding shop for a month or so. He isn't required to become an expert weldor, but he must learn how to run a bead and get into his fingertips the distinctions between the various types and brands of electrodes. He also learns how to repair regulators and welding torches and how to make minor adjustments on poorly functioning arc welders. Once this practical knowledge has been acquired, the candidate graduates to office work. He waits on customers and is sometimes given such work as the compiling of catalog sheets to familiarize him with the merchandise. Eventually, he becomes an outside man with his own territory.

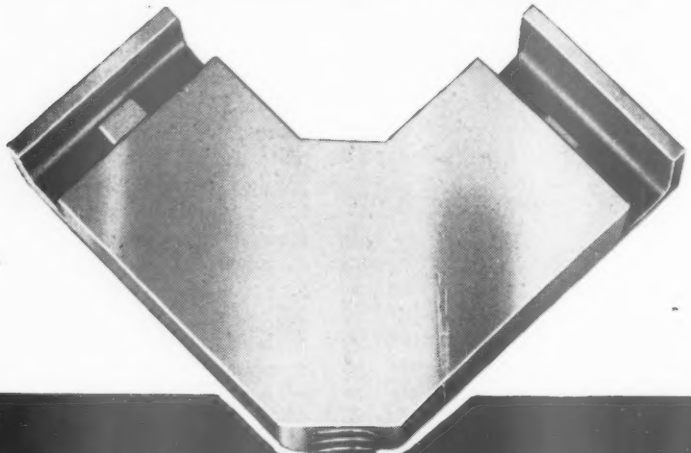
The Sutton-Garten Co. feels that a stated salary plus expenses and commission is the best way to compensate salesmen. Ordinarily, a young salesman is not in position to finance himself on the road long enough to build up a clientele. For this reason, the company feels that its method of compensation is the best. At the end of the year, bonuses are given to all employees according to the number of years they have been employed and according to their ability to produce. Mr. Garten feels that salesmanship is 98% perspiration and 2% inspiration. He requests that all of his salesmen make at least eight to ten calls per day and report on each call. Written reports are to be sent in each day to the office.

Advertising Program

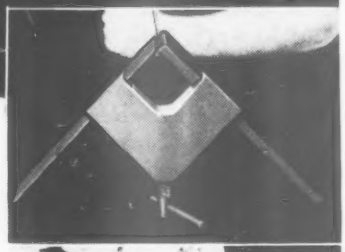
Garten has been using direct-mail advertising for all of his 30 business years and now has a mailing list of some 3,000 customers and prospects. Once a month he sends out a colorful blotter of the "pretty girl" type, the kind that will be kept on the customer's desk. A piece of manufacturer's sales literature imprinted with the Sutton-Garten name goes out with each blotter.

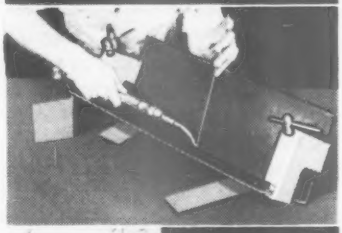
Garten's welding catalog is adorned by a large "S-G"—a monogram that stands for Sutton-Garten and also "Satisfaction guaranteed," a motto adopted in the early days of the business. The catalog is a 48-page, letterhead-size booklet with a two-page index, carefully cross-referenced. The print order was 5,000 copies. No attempt was made to list prices, and for this reason the expensive booklet is still good three years after its pub-

THERMO
PAT. PENDING
KORNER-KLAMP



HOLDS 2 PIECES AT
EXACT 90° ANGLE





For quick, easy welding of two pieces of metal, of same or unequal thickness, at positively correct right angle.
No tacking necessary.
No steel square needed.
No special fixture needed.
Every welding and sheet metal shop should have Korner-Klamps.
Can more than save their cost on one job.
Save money, time and trouble by asking your welding supply dealer for Korner-Klamps.

Only
$6.75

THERMACOTE COMPANY
Newark Chicago Los Angeles Portland

lication in 1945. However, it is about to be supplanted by a bigger and better 68-page catalog, now being compiled.

Blotters and catalogs are supplemented by display ads in the classified directories of Indianapolis, Fort Wayne and Richmond. Quarter-page ads are used in both Fort Wayne and Indianapolis; smaller space in Richmond. The company name is also included in boldface type under all listings pertaining to welding.

Customers and prospects are virtually all industrial concerns, mostly workers of light metal such as an auto body manufacturer and a steel furnace manufacturer. Coal mines represent another important business source. A fortunate circumstance is that the industries are well diversified, which probably accounts for the comparative immunity to business loss during the depression. Though Indiana contains much highly prosperous farming area, Sutton-Garten has not yet made any special effort to go out after the farm business. The reason why this has been neglected is that the present sales force had just about all it can handle calling on the industrial accounts in the area.

Welding Shop

An ace in the hole is the welding shop, which has continued for 30 years along with the supply business. During the war it served as a classroom for training weldors. Garten has had some interesting jobs. One of these was to weld reinforcing plates to the steel columns upholding the structure of a large department store so that an addition could be built on. The department store, not wishing to lose business, stipulated that the welding work be done without closing the store. Most of it was done at night, but the daytime welding did not disturb customers.

Garten is particularly proud of another job he did about 15 years ago. A large automobile manufacturer had been asked to produce an aluminum casting for the motor of a big bombing plane—an item of about $100,000. The core slipped during the casting, leaving a 2-in. opening into the crankcase. Frantically, the foundry superintendent telephoned Sutton-Garten to ask, "Can anything be done by welding?"

Garten inspected the casting and recommended that the big hole be

Abuse Proof!

Gasweld

HC-39 Pacemaker CUTTING TORCH

with extra heavy forged head

Approved by Underwriters' Laboratories

Improved, recessed tip design is proof against roughest treatment. Dropping this torch on its head can't damage the seat. Pacemakers stand lots of abuse.

Superior in cutting qualities, the Gasweld PACEMAKER can take plenty of on-the-job punishment...*and still operate perfectly.* Extra heavy forged heads and rear ends give longer service—*with less* maintenance. New recessed tip seat protects against damaging blows.

Superbly-balanced, they are easy handling. Exclusive "Free-Flow" jet design mixer provides greatest possible gas economy.

Wall Chemicals Division of

THE LIQUID CARBONIC CORPORATION

3110 South Kedzie Avenue **Chicago 23, Illinois**

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THE LIQUID CARBONIC CORPORATION
3110 South Kedzie Avenue, Chicago 23, Illinois

Gentlemen: Please send me full information on the Pacemaker Cutting Torch and a copy of your new catalog of Welding Equipment and Supplies.

*Name*_____

*Firm*_____

*Street Address*_____

*Town*_____ *State*_____

SEND FOR THIS FREE CATALOG

Mail Coupon TODAY!

Multi-Pic
— THE FIRST REAL IMPROVEMENT IN WELD HAMMERS
NOW EQUIPPED WITH
Repeater Brush
THAT WEARS AND WEARS AND WEARS AND WEARS

Multi-Pic is the improved weld hammer with 5 separate pic-pointed tool steel heads locked between free floating guide plates. Each single stroke of **Multi-Pic** gives five surface cleaning blows. The five picks adjust themselves automatically to the varied surface of any concave, convex or irregular shaped weld and clean quickly, easily, with fewer blows. Pic points are hardened, tempered tool steel which lasts indefinitely and can be resharpened.

Repeater Brush whisks away loosened slag, oxides and rust in a jiffy. The unique design makes it easy to reach into the deepest corners and crevices. The crimped oil hardened wire brush is provided with five quick and simple adjustments to compensate for wear and lasts five times as long as an ordinary brush.

Multi-Pic is supplied with double 5-pic pointed ends or with dual 5-pic and 25-pic pointed ends as illustated with or without the Repeater Brush. Extra Brushes—three in a carton.

ORDER FROM YOUR DEALER TODAY!

Try **Multi-Pic** in your own shop—on your own work. You'll welcome the quick, cleaner work of this new weld hammer which follows the contour.
If your dealer cannot supply you, write us for descriptive folder and name of nearest supply house.

Patents Pending.

BERNARD
WELDING EQUIPMENT CO.
741-743 East 71st Street • Chicago 19, Illinois

filled by a low-melting aluminum welding rod, applied by the oxyacetylene process. His own man did the work. There was no warping nor distortion, and the casting passed the rigid government inspection. The manufacturer was saved a $100,000 loss, and the several key men on the project retained their positions and reputations. The Sutton-Garten bill? Just $18.

"If we'd been a law firm, we'd have probably charged a $5,000 fee and got away with it," Garten commented, "but our policy has always been to bill a job on a strictly time-and-materials basis."

Sales on Trial

Sutton-Garten electrode business has jumped 50% in the past year, mostly by asking customers to try out new types of electrodes. Equipment is also put out on a basis of "use it and pay if you like it." You have to know your customers and products to get away with this.

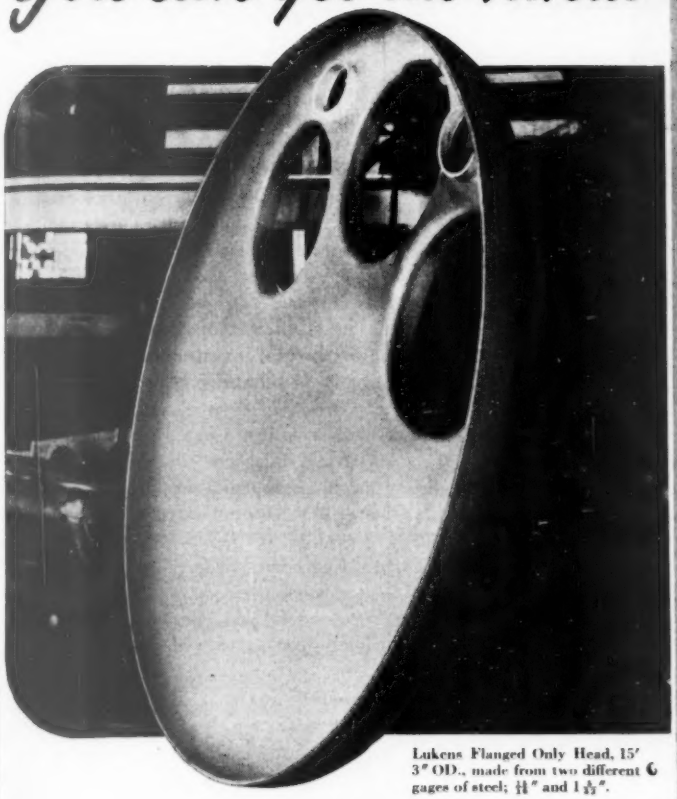
Many conditional sales contracts are made with men who want to start their own welding businesses. Sutton-Garten finances its own paper and hasn't lost 2% on installment sales because of bad debts. "That's because there have been almost no failures among welding shops," Garten says modestly.

Sutton-Garten owns a fleet of six trucks: three for Indianapolis, two for Fort Wayne and one for Richmond. Two of the Indianapolis and one of the Fort Wayne trucks are 1½-ton jobs suitable for the delivery of gas cylinders. The remaining three members of the fleet are light pick-up trucks.

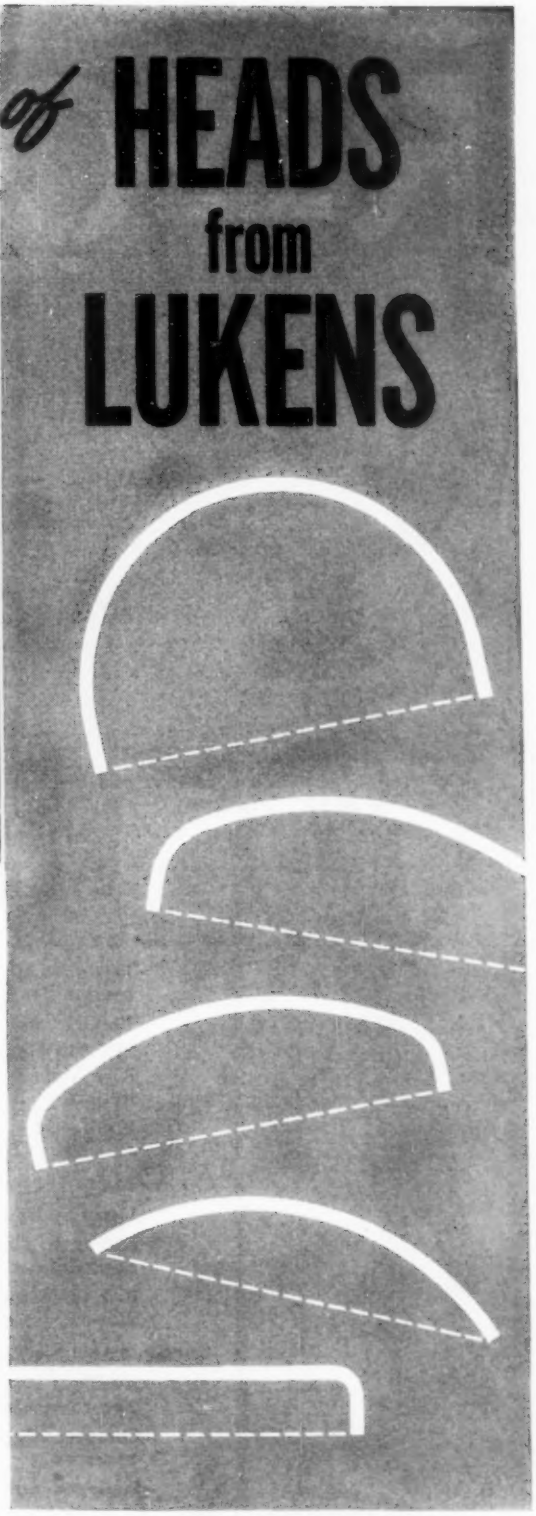
Some distributors think that money can be saved by using trucking companies for deliveries; Garten contends that this is "penny wise, pound foolish" economy. "You have to operate your own trucks to give customers the type of service they require and expect," he says. So firmly does Garten believe in giving service, that he never hesitates to make a delivery himself if it's necessary to meet an emergency.

A repair department goes hand in hand with the distribution of welding supplies. Garten has a full-time service man who is able to repair any make of gas regulator and make minor repairs on arc welders. Customers expect such service, just as

You can get all kinds of **HEADS from LUKENS**



Lukens Flanged Only Head, 15' 3" OD., made from two different gages of steel; $\frac{11}{16}$" and $1\frac{5}{16}$".



Heads four inches in diameter to over twenty feet; thicknesses up to six inches—Heads of any shape, from single-gage flat heads with straight flanges to complex multiple-gage heads, complete with flues and manholes—Heads of any commercial metal; carbon and alloy steels, including stainless, nonferrous metals and the widest range of clad steels available anywhere. Lukens makes them all!

Many sizes of Standard and ASME Flanged and Dished Heads are in stock, ready for prompt shipment. Hundreds of dies are available for making other styles and sizes, usually permitting us to ship heads within a short time after your order is received.

3,868 Heads are described in Lukens Catalog No. 1; stock heads, in Bulletin 433. For copies and for a quotation on your head requirements, write Lukens Steel Company, 416 Lukens Building, Coatesville, Penna.

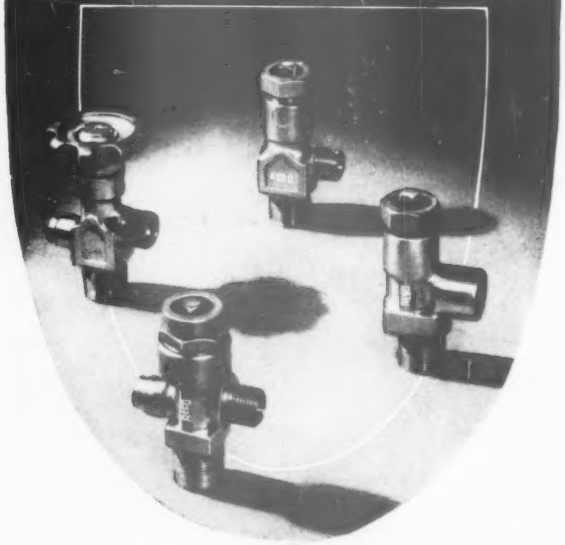
LUKENS HEADS ★

"Head Work", a 16mm motion picture in sound and color, on spinning and pressing of Lukens Heads is available without charge. Running time: 27 minutes. Write for a booking date.

FOUR INCHES TO OVER TWENTY FEET IN DIAMETER

• • SPEED SCRAP TO THE MILLS TO MAKE MORE STEEL • •

REGO*



HIGH PRESSURE CYLINDER VALVES

for OXYGEN and HYDROGEN

Designed, tested and proved for high pressures and severe service.

Packing may be replaced with cylinder under pressure if necessary.

Fuse plug and bursting disc provide positive safeguard.

Bronze stem furnished as standard, also available with monel stem on special order.

for ACETYLENE

Listed by Underwriters' Laboratories.

Cadmium-plated steel stem with monel tip resists rust and wear.

Ball-nose seat construction assures positive shut-off.

for CARBON DIOXIDE

Available with diaphragm-type or packed-type construction.

Compact, rugged design for use with high pressures.

Equipped with bursting disc safety device.

*Reg. U.S. Pat. Office

REGO

The BASTIAN-BLESSING Company
4201 Peterson Ave. Chicago 30, Ill.

Pioneer and Leader in the Design and Manufacture of Precision Equipment for Using and Controlling High Pressure Gases

they also expect prompt deliveries.

The Indianapolis building, occupied since 1929, measures 94 by 65 feet and provides some 6,100 sq ft of floor space for welding shop, offices, salesroom and merchandise storage. Additional storage space is provided by a separate 118 by 25 ft building half a block away, purchased 2½ years ago.

Almost the entire front of the salesroom is taken up by a large custom-built glass showcase. This case was designed to show to the best possible advantage welding supplies and accessory equipment offered for sale. The showcase has been a very much worthwhile investment, and the company is planning construction of an additional one.

The Sutton-Garten Co. has a large walk-in business. On many days, 50 or so cash sales are made over the counter, some for considerable amounts.

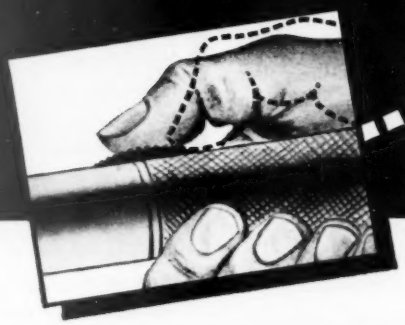
Customers won't call unless they can park their cars. Being near the center of town, Garten has found it necessary to provide parking space. Most customers can park on the 18-ft concrete apron in front of the store. Sutton-Garten also owns the 80 by 60 ft lot adjacent to its building, so there is ample space to take care of the overflow.

To sum up, hard work is the Garten recipe for success as a welding distributor. "Go to bed with your business," he advises, "live with it day and night. And give your customers a square deal. There is no substitute for a reputation that has been built up by constant effort over a term of years."

"We'll have to call in a technical adviser—there's something wrong with the way you do it."

Every Time you use the button...

1. You save money by preventing the waste of Oxygen and Acetylene that occurs every second a torch flame burns yet is not actually applied to work.
2. You save time by eliminating constant lighting, flame adjusting and Torch shut off. This adds materially to output of work.
3. You make life easier for the torch operator. A single quarter-inch movement of the thumb accomplishes the same result as a dozen or more motions, involving both hands.
4. You bring your operations up-to-date by as big an improvement as that made when self starters were added to automobiles — more so, in fact, since the Harris Automatic Torch repays its entire cost many times over in cash savings.
5. When you next see a torch burning, without being applied to work, decide to DO something about it! Contact the nearest Harris Exclusive Distributor, located in principal Cities. Better yet, do it now.

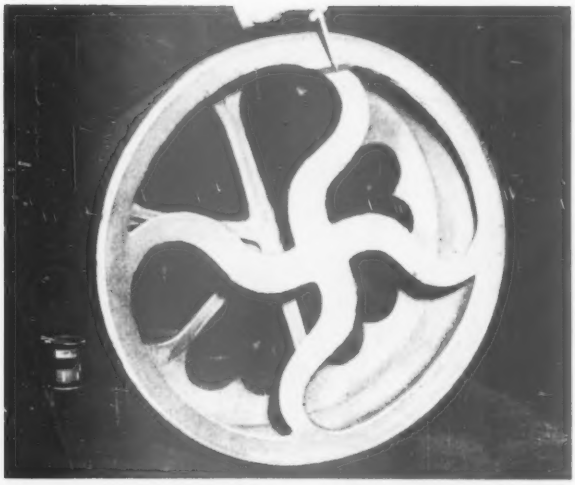


THE HARRIS CALORIFIC COMPANY

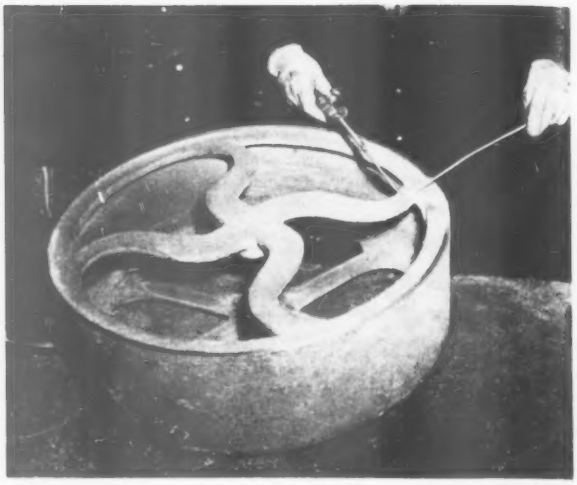
Cleveland 2, Ohio

HARRIS

SERVING THE METAL INDUSTRY SINCE 1905



1—BROKEN SPOKE was first beveled by grinding in order to provide a clean veed surface for brazing



3—BRAZING the spoke. Preheated area shown in Fig. 2 was held at black heat until repair was finished

Brazing Big Wheel

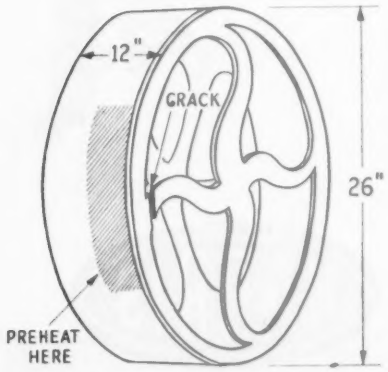
Repair of a cracked roller casting 26 in. in diameter affords an example of the speed and economy of a properly done brazing job

BY PHIL GLANZER

THE brazing procedure described here is one commonly used for the reclaiming of damaged gears, pulleys, wheels and similar cast-iron parts.

CRACK CLOSE TO RIM

The cracked roller casting pictured was 26 in. in diameter with a rim 12 in. wide. The crack went through one spoke at a point close to the rim.



2—PREHEATING was confined to the shaded area on rim. A black heat was applied with a torch

First, the crack was beveled by grinding to provide a clean surface (Fig. 1). Next, the roller face was preheated with a torch. As shown by the shading in the sketch (Fig. 2), the preheating was confined to a broad strip on the rim near the fracture. The heated area included about two thirds of the width of the roller face and extended a little more than halfway to the next sound spoke on either side of the crack. A black heat over this area expanded the rim and pulled the broken edges of the spoke about 1/16 in. apart for welding.

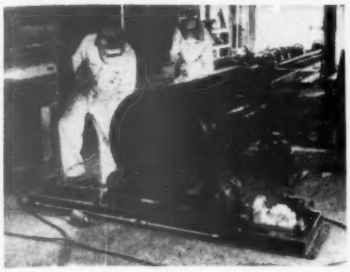
BRAZED AT BLACK HEAT

The spoke was brazed with a patented bronze rod (Fig. 3) while the preheated area of the rim was held at a black heat. The heating kept the 1/16-in. spacing between the ground edges of the spoke intact until welding had been finished (Fig. 4). Both the rim and the weld were then allowed to cool slowly. No serious locked-up stresses were left in the casting.

4—READY FOR SERVICE. Altogether, repair took 20 minutes

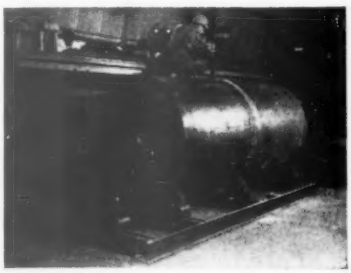
Complete repair by brazing took only 20 minutes, and the cost amounted to a fraction of that of a new roller.

REED ENGINEERED JIGS and FIXTURES for AUTOMATIC WELDING



PORTABLE TURNING ROLLS

These rolls are built with variable speed drive and are available in 3-ton, 6-ton, 12-ton, 25-ton and 50-ton sizes. The 3-ton unit illustrated above sells for $925.00 complete with one power and one idler unit F. O. B. factory.



UNIT TYPE TURNING ROLLS

These machines combine both power rotation of work and track support for automatic welding head into one compact unit. Five standard sizes are available for welding tanks up to 10 ft. in diameter.

LONGITUDINAL SEAM WELDER

For high production welding on longitudinal seams, the Reed Horn Type Jig has no equal. This unit combines a copper backup with a mechanical toggle linkage to press the seam absolutely flat prior to welding.

The Above Machines And Many Others Are Shown In Our New Bulletin No. 65. A Copy Will Be Mailed At Your Request.

REED ENGINEERING CO.
CARTHAGE MISSOURI U.S.A.

ENGINEERS AND MANUFACTURERS

2 NEW WILLSON MONO *Goggles*

Newly styled plastic eye protection with choice of curved or flat lenses offer new features designed to add to their already predominant popularity. The WILLSON MONOGOGGLE, just over an ounce in weight, is the answer to getting safety equipment worn on many hazardous jobs.

- The new flat lens design retains all the safety features of the curved lens.
- Both provide ample room for wearing of prescription glasses in comfort. The flat style, however, provides additional clearance for molded spectacle frames.
- New drop-eye shape gives wider vision.
- Greater ventilation area provides better air circulation and more wearer comfort.
- Both new designs available in clear acetate frames or the new flexible, mottled-brown, polythene frame.

WILLSON*

For complete information on these products and their application, as well as other eye and respiratory protective devices, get in touch with your Willson distributor or write us direct.

*T. M. Reg. U. S. Pat. Off.

WILLSON PRODUCTS, INC., 227 WASHINGTON STREET, READING, PA.

WHAT WELDING MEANS

(Continued from page 39)

ever made in the metals industry, THE WELDING ENGINEER undertook to determine where welding is being used in the metals industry, what welding processes are employed in different types of plants, whether welding is used for maintenance or for production. We can't help but be happy over the results.

The first phase of the study was conducted among the primary metal industries, the makers and rollers and casters of ferrous and non-ferrous metals. Some 1,738 smelters, rolling mills and foundries were surveyed, representing the major portion of all the concerns who refine and prepare metals for further uses.

Of the 1,738 plants surveyed, we were able to obtain the information requested from 635 or 37%. This is a phenomenal response, as anyone who has ever engaged in market research will readily recognize. We cannot help but believe that the comparatively large return is in some measure a reflection of more than thirty years of service which THE WELDING ENGINEER has given to those interested in welding and flame processes.

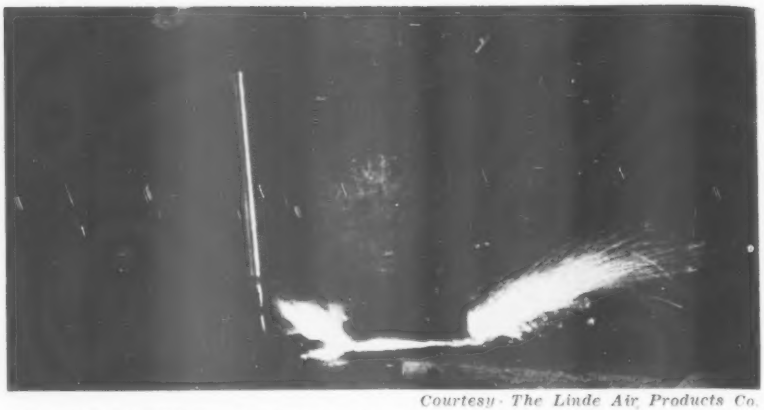
The survey first discloses (Table I) that 91% of the responding plants use welding processes. Most consistent users were the primary and secondary smelters and refineries of non-ferrous metals, who reported 100% affirmatively to the question, "Do you use welding?" Only shortly behind this group were steel works, blast furnaces and rolling mills, who reported themselves as 98% users.

MAINTENANCE APPLICATIONS

Of the 635 plants reporting in the primary metals industry, 89% indicated that welding was used for maintenance applications, 40% for production purposes. Table II shows how production and maintenance welding are divided among the three chief processes: arc, gas and resistance welding. The arc process is used in 91% of the 568 plants reporting maintenance applications. Gas welding and/or cutting are used by 84% and resistance welding by 7% of the plants for maintenance. The percentage total is more than 100%, indicating, obviously, that many plants employ more than one process. In some cases arc, gas and resistance welding as well as flame-cutting will all be used in a single plant of the primary metals group.

There are many places where the welding and cutting processes play important parts in the maintaining of steel mills and iron and steel foundries. Reclamation work starts at the blast furnace; the open-hearth furnaces with their water-cooled doors, frames and dog houses are likewise frequently repaired. The burnt-out or leaky portion is removed by flame-cutting and replaced by a plate flame-cut to size and welded in place.

Hard-facing applications are many on the rolls, wobblers and dies. Also, the oxyacetylene flame is employed to heat specified areas of plates, bars and angles in preparation for bending and shaping and to heat the rivets driven in to make structural repairs.



Courtesy The Linde Air Products Co.

IN THE FOUNDRY, the cutting torch quickly slices through a cast-steel riser

PRODUCTION PURPOSES

On the production end of the picture, we find that 253—40% of the 635 plants represented—use welding and/or flame-cutting for production purposes. Arc welding is done in 79% of these 253 plants, gas welding and flame-cutting in 56% and resistance welding in 24%.

Flame-cutting is particularly important to steel production. First we see it in the scrapyard, where bulky scrap is reduced to charging-box sizes. The blast furnace is tapped by means of the oxyacetylene flame. The hot top of the ingot is flame-cut away, and the sound lower portion is flame-deseamed and flame-scaled prior to entering the rolling mill.

In the foundry, the oxyacetylene flame is used to cut risers. Should the material being cast be a hard-to-oxidize alloy such as stainless steel or some of the non-ferrous metals, the powder cutting process is employed or the oxy-arc torch.

Both arc and gas welding have also become increasingly important in the foundry for the salvaging of defective castings. Blowholes, inclusions and other defects are removed by flame-gouging and replaced with sound weld metal. When the casting has been peened and cleaned, it is next to impossible to detect where the welded repairs were made.

WELDORS PER PLANT

Table III presents data on the sizes of plants that do welding. The plants are divided into five employment categories, beginning with those that employ 50-99 people and ending with large plants employing 2,500 or more. Table IV indicates the number of weldors employed in each of the five categories. There is a marked gain in the number of weldors employed as the size of the plant increases, indicating that welding is one of the essential keys to greater production. The larger the plant, the greater the number of weldors needed to meet schedules.

From Tables III and IV, we find that there is slightly over one weldor per plant in the smallest of the plants surveyed. In the largest plant there is an average of over 18 weldors per plant.

NEXT MONTH: *Welding in Fabricated Metal Products*

Comparative Magnesium-Alloy Specifications

FORM	NOMINAL COMPOSITION (Mg. Remainder)			DOW	AMER. MAG.	ARMY-NAVY AERO		AAF		NAVY[1]		ARMY		ASTM		ASM	SAE
	Al	Zn	Mn	Alloy	Alloy	Spec.	Alloy	Spec.	Alloy	Spec.	Alloy	Spec.	Alloy	Spec.	Alloy		
Sheet	—	—	1.5	M	3S	AN-M-30				47M2	11	57-157	11	B-90-46T	M1	4370	51
	3.0	1.0	0.3	FS-1	C52S	AN-M-29				47M2	18	57-157	18	B90-46T	AZ31X		510
Extruded Bar, Rods and Shapes	—	—	1.5	M	3S	AN-M-26						AXS1328[2]	11	B107-45T	M1		522
	3.0	1.0	0.3	FS-1	C52S	AN-M-27						AXS1328	18	B107-45T	AZ31X		52
	6.5	1.0	0.2	J-1	C57S	AN-M-24						AXS1328	8	B107-45T	AZ61X	4350	520
	8.5	0.5	0.2	O-1	C58S	AN-M-25						AXS1328	9	B107-45T	AZ80X		523
Tubing	—	—	1.5	M	3S	AN-T-73				44T35	11	57-193	11	B217-46T	M1		522
	3.0	1.0	0.3	FS-1	C52S	AN-T-72						57-193	18	B217-46T	AZ31X		52
	6.5	1.0	0.2	J-1	C57S	AN-T-71				44T35	8			B217-46T	AZ61X		520
Forgings	—	—	1.5	M	3S	AN-M-22				46M13	11						533
	3.0	1.0	0.3	FS-1	C52S	AN-M-20								B91-45T	AZ31X		
	6.5	1.0	0.2	J-1	C57S	AN-M-21				46M13	8			B91-45T	AZ61X		531
	8.5	0.5	0.2	O-1	C58S	AN-M-23				46M13	9			B91-45T	AZ80X	4360	532
	3.5	(5.0 Sn)	0.5	D	65S	AN-M-23				46M13	16			B91-45T	AT35		53
Sand Castings	8.0	—	0.2	A	241									B80-45T	A8 & A-8X		
	12.0	—	0.2	B	246									B80-45T	A-12		
	9.0	2.0	0.1	C	260	AN-M-36	C							B80-45T	AZ92 & AZ92X	4430[3]	500
	10.0	—	0.1	G	240									B80-45T	A-10		
	6.0	3.0	0.2	H	265	AN-M-36	A					57-74-1E		B80-45T	AZ63 & AZ63X	4420[4]	50
	—	—	1.3	M	403	AN-M-36	B							B80-45T	M1		
Permanent Mold	9.0	2.0	0.1	C	260			11349				57-74-2		B199-45T	AZ92	4184	503
	10.0	—	0.1	G	240			11348						B199-45T	A10 & A-10X		
Die Castings	9.0	0.2	0.6	R	263	AN-M-16						57-74-3		B94-44T	AZ90	4190	501
Welding Rod	—	—	1.5	M	3S			11322	A								
	9.0	2.0	0.1	C	260			11322	B								
	6.5	1.0	0.2	J-1	C57S			11322	C								

(1) Applies to Bureaus of Navy other than Aeronautics. For Bureau of Aeronautics Army-Navy Aero. specifications apply.
(2) Ordnance Department.
(3) ASM-4434 Heat treated and aged.
(4) ASM-4420 as cast, AMS-4422 Heat treated, AMS-4424 Heat treated and aged.
Letter or numerical suffixes designating revisions are omitted, since the lastest revision in effect should always be used.

Courtesy of Brooks and Perkins, Inc.

Introducing

4 ENTIRELY NEW FLUXES *by* VICTOR

Developed to Give You Cleaner, Stronger Welds at Lower Cost

These 4 new fluxes—One of the greatest developments in fluxes in 20 years—are the result of intensive engineering research based on Victor's 40 years of practical welding experience. Try them; see for yourself how to get *more brazing per pound* with these 4 new fluxes.

Victor's New Fluxes Fulfill All these Important Requirements

- Effectively clean parent and filler metal
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- Do not blow off rod
- Contain no useless ingredients
- Leave finished braze clean
- Contain no toxic ingredients
- "Tin" burned spots in cast iron brazing
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Get your supply from your welding dealer **TODAY**

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Victor No. 3 Flux for brazing brass and bronze, steel, clean cast and malleable iron. Leaves clean, natural finish.

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Victor No. 5 Flux for moderate heat brazing of cast and malleable iron. Excellent for dirty castings.

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Victor No. 7 Flux for high heat brazing of cast and malleable iron where base metal gets exceptionally hot.

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Victor No. 9 Flux for cast iron welding. Fast and effective. Will not cake when container is subjected to moderately high heat.

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WHY 4 TYPES OF KODAK INDUSTRIAL X-RAY FILM?

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Radiography in industry meets widely varying conditions—differences in density of materials, in size of objects, in type of radiation, and in the capacity of the X-ray equipment available.

No one film, or even two could give best radiographic results under all conditions. So Kodak provides industrial X-ray film in four types.

These afford the choice of speeds, contrast, and graininess that assure dependable, uniform results even under difficult situations.

TYPE M . . . provides highest contrast and exceptional detail under direct exposure or with lead foil screens—has extra fine grain, and speed is adequate for radiography of light alloys at average kilovoltage and for much million-volt work.

TYPE A . . . has high contrast with greater speed. For study of light alloys at lower voltage than practical with Type M, and at 1000 KV, for heavier parts than the finer grain film permits. Used direct or with lead foil screens.

TYPE F . . . offers highest available speed and contrast when exposed with calcium tungstate intensifying screens. Film has wide latitude with lead screen exposure either to X-rays or gamma rays.

TYPE K . . . has medium contrast. Chosen where speed is important and calcium tungstate intensifying screens are not used. Especially advantageous in studying heavy steel parts by gamma rays, and for the fastest X-ray diffraction exposures.

EASTMAN KODAK COMPANY
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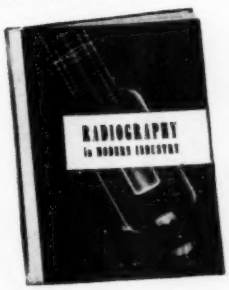
A wealth of invaluable data on radiographic principles, practice, and technics. Profusely illustrated with photographs, colorful drawings, diagrams, and charts. Get your copy from your local X-ray dealer—price $3.



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on the job

BEFORE PICTURE shows how bow casting of *Chungking Victory* was completely destroyed. Note damage to bottom shell plates

NEW BOW SECTION has been erected; the damage to bottom shell plates has been repaired, and the ship is ready for launching

Salvage *Chungking Victory*

THE Chinese ship *Chungking Victory* ran aground and completely destroyed her bow casting, along with plating and internals in the bow and Nos. 1 and 2 double bottoms. To prepare the patterns and recast the damaged section would have taken as long as 60 days. The shipbuilding division of Bethlehem Steel Co., San Francisco, completed the job in only seven days, including lofting, fabricating, welding, stress relieving, checking for alignment and erection of the new bow on the ship.

Plating used in the weldment was 1½ and 2 in. thick. Some 650 lb of electrodes, mostly 5/16 in., were deposited.

* * *

Lower Weight, Less Cost

BY USING welding equipment, the Baltimore Broom Machine Co. has reduced both the weight and the cost of frames for its broom-sewing machines, according to Charles E. McCaffrey, engineer-superintendent and director.

The change to welded frames was brought about by the increased difficulty and delay experienced in obtaining the cast frames formerly used. In addition, the cost of the castings bore heavily on the cost of the completed machines.

In deciding to convert to a welded frame, important consideration had to be given to the continued use of existing jigs and fixtures as well as to the retention of the design of numerous appending parts. Despite these design difficulties, the engineers proceeded to fashion a workable weldment. Using sheared or flame-cut flat steel wherever possible and a 200-amp a-c welder, they took advantage of the possibilities offered by welding to achieve lighter sections.

Results were marked reduction in cost, a weight decrease of 33⅓% and a structure stronger than the casting. So pleased is the Baltimore Broom Machine Co. that it is going to apply welding to some of its other operations to effect further savings and improvement in production.

Pipe Support

By M. H. Pearce

WELDOR for an oil-drilling contractor worked out a pipe support that also clamps for a mud line carrying high-pressure fluid under a fluctuating, pulsating load.

In the bottom center picture, the vertical piece below the horizontal piping was formed from a pipe an inch less in diameter than the line it carries. Top of the support was torch cut to form a cradle curved to line pipe contour. A 1 5/16-in. hole was cut through both walls of the support, and a 1¼-in. pipe, long enough to project at either end, was inserted through this opening. A hole large enough for a U-bolt was then drilled through each projecting end of the pin.

To clamp the pipe, the nuts are pulled tight at either end of the U-bolt, which encircles the pipe being carried. The pin, rotating in the hole through the support, shifts to bring the pull of the U-bolt against the riser of the pipe fitting. If one U-bolt is faced with the flow (as in the illustration), the next one is set in the opposite direction. In this way lateral shift is checked in both directions.

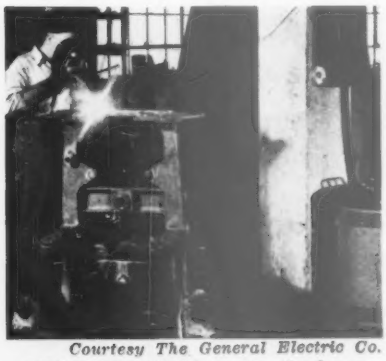
* * *

Punch Press Repaired

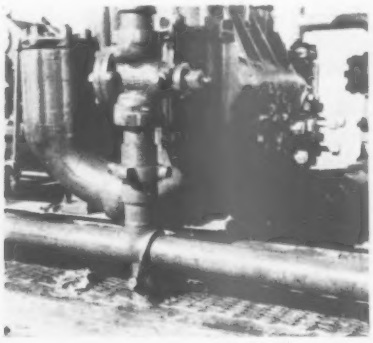
A 100-TON punch press for punching carbon-steel angles used in manufacturing metal beds broke because of a hidden flaw in the internal section of the huge strap (indicated by arrow on the accompanying picture). Normal delivery for a new part would have taken 8 to 12 weeks. Four hours of welding time and a few dollars worth of welding rods achieved this "almost-impossible" repair.

The strap was removed from the press, and the break veed out to a 90-deg angle and preheated in a blacksmith forge to 600 F. The vee was filled by depositing approximately five lb of ⅛-in. low-temperature welding rods (flux-coated for low-heat applications). The casting was then returned to the forge and covered with hot ashes until morning.

The strap was reinstalled in the press, permitting the normal flow of production of the steel angles to be maintained. A tie-up of this production unit for any length would have shut down the entire plant.

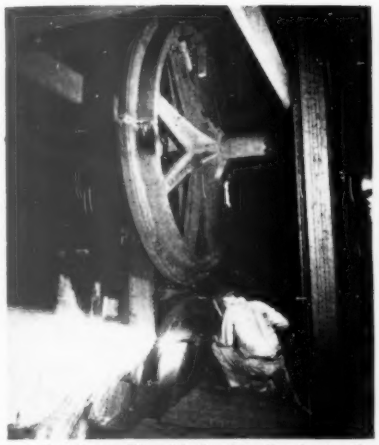


Courtesy The General Electric Co.
WELDMENT REPLACES casting for broom machine frame, reducing weight by 33 1/3%



U-BOLT is affixed to pin, which rotates to bring pull of U-bolt against pipe riser

Courtesy Eutectic Welding Alloys Corp.
CAST-IRON punch press broke as shown by arrow, was repaired in four hours' welding



Courtesy The Linde Air Products Co.

BIG WHEELS of cast iron were powder-cut through the rim in only 12 minutes per cut

Scrapping 10½-Ft Wheels

POWDER cutting proved to be the answer in the scrapping of cast-iron wheels 10 ft 6 in. in diameter at the Bates Expanded Metal Co., East Chicago, Ind. Each of these wheels weighed about 5 tons. Two previous attempts to scrap them by ordinary flame-cutting had failed.

The job was successfully performed by J. L. Phillips of Chicago, a contractor for heavy scrapping jobs, by using a cutting torch equipped with a powder adaptor. Four cuts were made in each rim—13 in. thick at its thickest section.

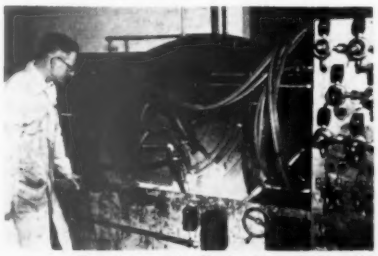
* * *

Flame-Hardened Molds

MORLEY Machinery Corp., Rochester, N. Y., was asked to solve a tricky problem for one of its customers. The Garlock Packing Co., of Palmyra, N. Y., is engaged in the manufacture of mechanical packing made of rubber composition. The steel molds used in the manufacturing process were wearing out inordinately fast.

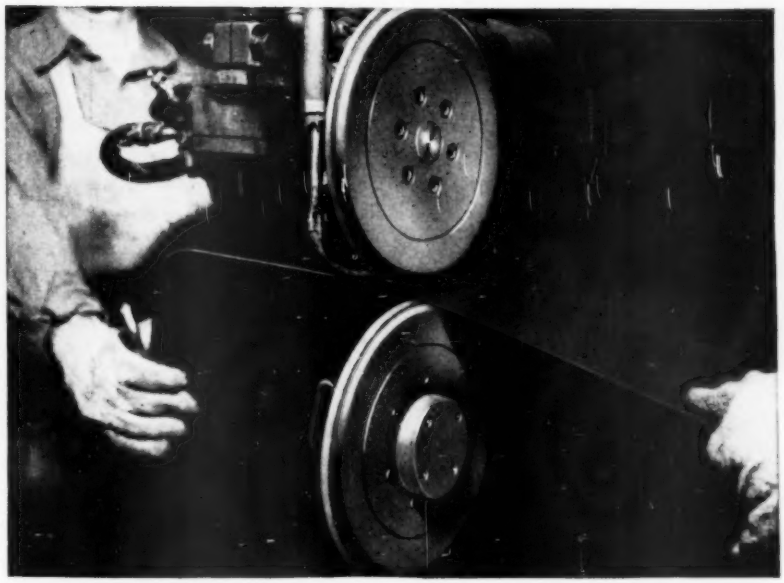
Morley engineers called in a manufacturer's technical sales representative to help devise a flame-hardening set-up. Two revolving tables were built to accommodate molds up to 64 in. in diameter, above which were mounted flame-hardening torches and quenches.

Depth of flame-hardening was controlled to about 1/16 in. on the lips and faces of each set of molds. Not only was wearability increased, but the quality of packing was also improved.



Courtesy Air Reduction Sales Co.

INCREASED WEAR resulted when molds for rubber packing were flame-hardened as shown



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SEAM WELDING WHEELS

Weiger-Weed alloys are forged and machined into wheels of proved quality for the exact requirements of each particular job—each weldable material—each operation. In strong clean welds, durability in high production runs, minimum down time Weiger-Weed wheels have a record of uniform dependability. For speedy delivery several sizes of blanks are carried in stock. These can be supplied finished or sent rough for your own machining. In most cases you will save time and money by letting Weiger-Weed finish to your specifications.

Call a WW engineer for help on your specific problems, without obligation. Or send us diameter, thickness and characteristics of material to be welded. Recommendations will be promptly furnished.

This new WW Manual covers latest helps on resistance welding. Send for your copy.

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Dependability of WW Tips for more and better welds at top production, with less dressing, is well known to the industry. Most sizes and shapes are in stock for prompt delivery. Also WW Holders of outstanding success in LEAK-PROOF, trouble-free service.

For electrodes and dies for resistance welding—spot, seam, flash, butt, projection, Weiger-Weed products are unsurpassed. Investigate and you'll see why. Weiger-Weed & Company, Division of Fansteel Metallurgical Corporation, 11644 Cloverdale Ave., Detroit 4, Michigan.

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New Products to Use

REPLACEABLE bits of varied style may be set at any angle with this chipping hammer

Chipping Hammer

REPLACEMENT of worn bits for weld chipping hammers is practical with the new Atlas "Re-Bit" hammer, which holds two bits. No balls, springs, screws or clamps are used; only a simple taper that locks both bits to the head in any position desired. Blades have also been redesigned to incorporate better visibility, longer life and a wider chipping edge. "Re-bit" tomahawks are offered in 12 and 16 oz. weights with "Flex-O-Steel" or wooden handles. ATLAS WELDING ACCESSORIES CO., 707 East Lewiston, Detroit 20.

* * *

FOUR COILS featured in small a-c farm welder. Draws 30 amp from power line

Farm Welder

SMALL a-c farm welder meeting NEMA and REA specifications is being manufactured by U. S. Electric Welder Corp. It is said to draw only 30 amp from the power line. The welding transformer has four coils and is operated on single phase or on one leg of two-phase or three-phase lines.

A set of cables, electrode holder, shield and electrode assortment are furnished with each welder. Mounted on ball-bearing casters, the welder measures 21 by 14 by 22 in. U. S. ELECTRIC WELDER CORP., 1258 Dorr St., Toledo 7, O.

* * *

High-Tensile Electrode

HIGH-SULPHUR, high-carbon and low-alloy, high strength and hardenable steels are said to be weldable with the new Champion "Hy-Lo" electrode, a high-tensile electrode in the AWS E-7015 class. This electrode is recommended for steel to be galvanized or porcelain enameled, for steel of doubtful analysis, for welding manganese or spring steel to mild steel, for locomotive frames, flexible staybolt-sleeves, etc. In addition to E-7015, it is also supplied in the higher tensile ranges: E-8015, E-9015 and E-10015. WELDING DIVISION, THE CHAMPION RIVET CO., Cleveland, O.

* * *

PORTABLE fire extinguisher puts out oil, grease, electrical fires. 16-oz. capacity

Small Fire Extinguisher

APPROVED by Underwriters' Laboratories, a new 16-oz. portable fire extinguisher will put out gasoline, fuel oil, paper, grease or electrical fires by means of a 90% carbon tetrachloride solution propelled by carbon dioxide. At the pull of the trigger, an 18-ft stream is released. Chemical is not injurious to persons and materials it contacts. BOSTWICK LABORATORIES, Bridgeport 5, Conn.

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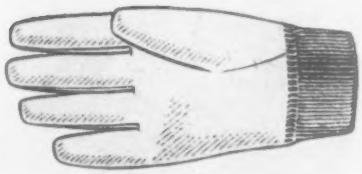
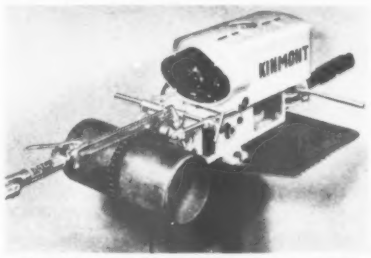


PLASTIC-COATED glove is said to outwear rubber gloves in oil or heat conditions

Coated Glove

NEW plastic-coated and impregnated "Plastigluv" has a cotton fabric base and is said to give several times the wear normally expected of rubber-coated gloves. "Plastigluv" is claimed to protect the hands from chemicals, abrasion burns, flame, heat and liquids. Glove is also reputed to have high dielectric strength and to be impervious to most oils. Plastic coating gives a non-slip gripping surface and also eliminates exposed seams, a common starting point for damage. BELLE CITY GLOVE CO., 112 East Chestnut St., Chicago 11.

* * *



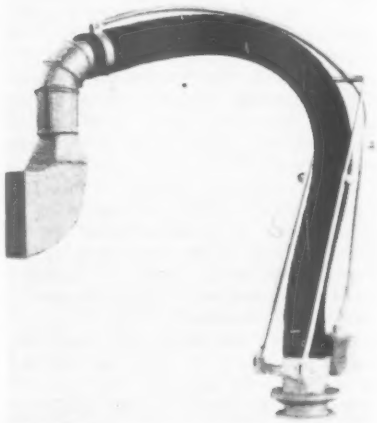
CUTTING-TORCH attachment for small power unit is said to assure square cuts

Pipe-Cutting Attachment

SMOOTH bevel and a square cut-off are said to be consistently produced by a new torch attachment for use in cutting pipe. Adjustment range of the attachment permits its use on pipe of diameters from 3 to 36 in. A foot switch controls the turning operation so that the operator's hands are free to make torch and speed adjustments.

The power unit with which this attachment is used features a patented split-link chain drive; the chain holds the pipe tightly locked in position and turning against fixed rollers on the power unit. KINMONT MFG. CO., INC., 716-718 West Wilson Ave., Glendale 3, Calif.

* * *



OVERHANG of counterweight is eliminated in design of dust collector assembly

Dust Collector Tube

NEW suction tube assemblies for the Torit self-contained dust collectors are made in 3 and 4 in. sizes to fit standard inlet holes. Hose is duck-covered for greater flexibility. Holding framework follows the curve of the tubing and former overhang of the counterweight has been eliminated.

The new tube assemblies can be fitted with either vertical or angular nozzles. TORIT MFG. CO., 303 Walnut St., St. Paul 2, Minn.

New Federal Hydraulic Flash Welder Makes Difficult Aluminum Welds Easy

Section cut through bus window frame, production welded in a single operation on the new Federal Flash Welder. Note variable thickness of section ranging from 1/8" to 5/8".

OPERATION HERETOFORE CONSIDERED IMPRACTICAL NOW A PRODUCTION LINE REALITY

The Federal Machine & Welder Company developed for one of the nation's largest manufacturers of bus window and door frames, a hydraulically operated flash welder that would weld together sections of aluminum framing. The new welder turned a difficult and costly job into an inexpensive, high speed production operation.

This is another example of Federal welding "know-how" — another reason why Federal is first in resistance welding.

FEDERAL HYDRAULIC FLASH WELDER OFFERS THESE *Exclusive Features*

1. No tools required to set up or change the amount of upset, flash, final platen opening, pre-heat or position of current cutoff.
2. Change in final platen opening will not affect any other adjustment.
3. Change in position of current cutoff will not affect any other adjustment.
4. Change in adjustment to increase or decrease the amount of upset or flash will not change the relation of current cutoff to upset, finish, amount of pre-heat or final platen opening.
5. Complete control over upset speed.
6. Advantage of a two-speed upset for the welding of aluminum and other material requiring a rapid closure and slower forging action for best results. The speed of the forging action is adjustable.
7. It is not necessary to change flashing cams to weld steel, aluminum, copper, brass, or cast iron in any cross sectional area within the capacity of the machine.
8. Time necessary for a new setup when changing the machine from welding one material to another is a matter of minutes, where a die change is not required.
9. Retractable stroke for loading and unloading odd shaped pieces or parts loaded over locating pins. This feature is incorporated as part of the design and does not require any extra mechanism.
10. Platen may be slightly retracted in order to flash weld parts that must be loaded tight together. This feature, too, is a part of the design, requiring no extra mechanism.

RESISTANCE WELDERS FOR EVERY APPLICATION
PRESSES FROM 50-TON OBI TO 2000-TON DOUBLE ACTION

Federal® WELDERS

THE FEDERAL MACHINE AND WELDER COMPANY
Dept. 329 Warren, Ohio • • Offices in Principal Cities

Warco® PRESSES

10, 40 and 60 Cu. Ft.
ACETYLENE
CYLINDERS
NOW AVAILABLE
for Early Delivery

60 cu. ft.

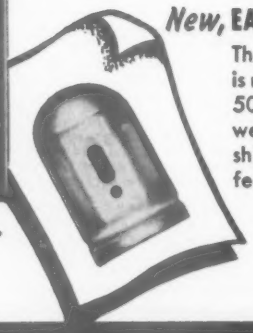
40 cu. ft.

10 cu. ft.

New Low Prices
Faster Pumping
Lighter Weights

These are plus features of the new C G Cylinders with the C G C improved porous monolithic filler. Completely tested and approved by the U. S. Bureau of Explosives . . . these new Acetylene Cylinders conform in every detail to ICC specification EIGHT!

All large sizes...100, 150, 250 and 300 minimum Cu. Ft. capacities... are also available, and hold maximum gas capacities at normal pumping pressures.



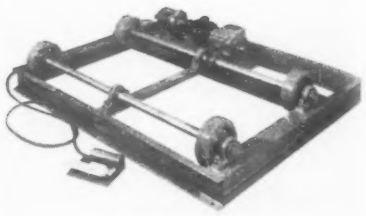
New, EASIER TO GRIP OCTAGON CAP

The exclusive CGC Octagon Cap is now available for separate order. 50% thicker dome, 25% lighter weight, smooth finish and extra large shipping tag holes are popular features.

CGC

COMPRESSED GAS CYLINDERS, Inc.

P. O. Box 222, Vernon Branch • 2909 East 54th Street, Los Angeles 11



INTEGRATED turning roll handles diameters up to 6 ft, lengths up to 12 ft

Unit Type Turning Roll

NEWLY developed turning roll Model RD-20 has both power and idler rolls in one frame. Its four rubber-tired wheels can handle diameters from 3 in. to 6 ft. and lengths from 12 in. to 12 ft. The weight capacity is 2,000 lb and a variable speed transmission provides speeds up to 120 ipm.

Primary reduction for the rolls is provided by totally enclosed worm gears. The machine comes equipped with motor and foot-operated switch. Overall dimensions are 60 by 72 in. THE REED ENGINEERING CO., 1003-17 Fairview Ave., Carthage, Mo.

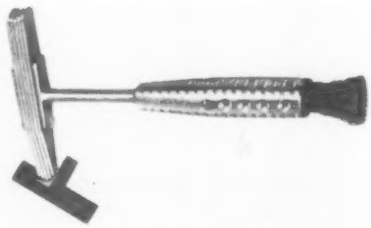
* * *

Dust Collector

MODEL 20N30 "Dustkop" is the name of a new portable dust collector designed for handling dust from grinding and cutting operations. The self-clearing paddle-wheel fan is direct-driven by a 3-hp motor. Dust is removed from air stream by a cyclone separator and deposited in a removable drawer in the dust bin.

Based on instrument test, the model 20N30 has a capacity of 2,030 cfm, with 8,600 fpm velocity and 4.5 in. static suction, all on 7-in. pipe. Floor size required is 22 by 40 in. Overall height is 56 in.; shipping weight 400 lb. AGET-DETROIT CO., Main at Washington, Ann Arbor, Mich.

* * *



REPEATER slag-cleaning brush is feature of the new "Multi-Pic" sealing hammer

Wire Brush and Sealing Hammer

SLAG, oxides and rust are easily swept away by the wire brush incorporated in the handle of the new Bernard "Multi-Pic" weld-cleaning tool. Brush is made of crimped oil-hardened wire and can be used for its entire length. As the end wears, a flat-head screw, which holds the shank, is removed and another usable portion of the brush drawn out. Five such adjustments may be made.

The previously announced "Multi-Pic" weld hammer has five separate tool-steel heads, which are provided with free-floating action between guide plates welded to a steel shank. BERNARD WELDING EQUIPMENT CO., 741-743 East 71st St., Chicago 19.

EXTRA-HEAVY cutting is made easier with new Linde C-60 cutting torch. Steel button shown measures more than six feet thick

Cutting Torch

LARGE cutting torch, the Oxweld C-60 machine cutting type, is designed for very heavy cutting operations, such as scrap cutting of skulls and buttons at steel mills. Cutting of steel over 6 ft. thick has been reported. It can be used with or without powder cutting attachment.

The C-60 is a mixer-type torch, using an Oxweld W-42 machine-heating unit to mix preheat gases. It has no valves. Medium-pressure acetylene is supplied from an acetylene generator or manifolded cylinders. THE LINDE AIR PRODUCTS CO., 30 East 42nd St., New York City 17.

* * *

Hard-facing Powder

IMPROVED hard-surfacing powder, called "Surfaceweld A," is made to be applied with a carbon electrode. The deposited surface is a thin, hard layer of chromium carbide, said to be resistant to abrasive wear and corrosion.

Outstanding characteristic of the powder is its ability to be applied with an a-c arc and a single carbon electrode. It may also be used with a twin-carbon arc or with d-c (carbon electrode negative).

Deposit is smooth, dense and has a hardness of about 54-61 Rockwell C for one layer and 57-63 for multiple layers. This powder hard-facing process is recommended for the cutting edges of garden tools, disc plows, mixing blades, bucket lips, forming dies, etc. LINCOLN ELECTRIC CO., Cleveland 1.

* * *

Metallizing Equipment

WIRE control and straightener unit for metallizing guns, Metco type 2W, has an outer metal hoop that keeps the coil on the reel and prevents the wire from riding off or getting tangled under the arms. Other features are: ball-type thrust bearings; adjustable parts equipped with thumb screws for quick adjustment; ready mounting on automatic set-ups or benches; one adjustment to feed the wire in any desired direction. METALLIZING ENGINEERING CO., INC., 38-14 30th St., Long Island City 1, N. Y.

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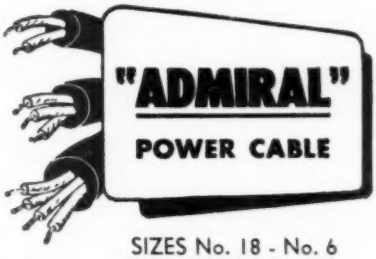
America's 1st Choice

SIZES No. 6 - No. 4/0

A Fast Seller



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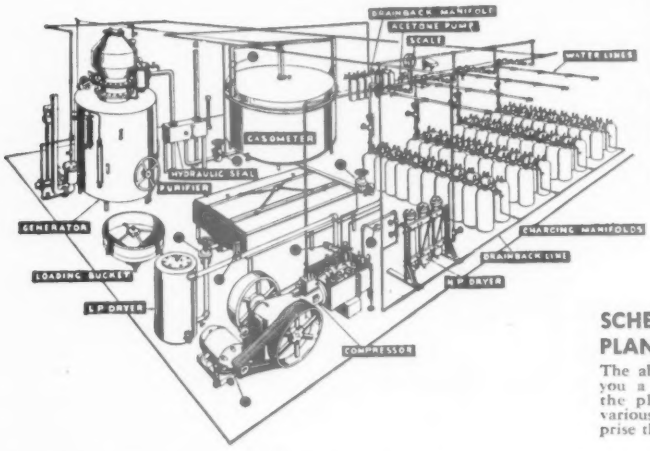
A *Low Pressure* ACETYLENE PRODUCING PLANT that Charges up to 160 CYLINDERS at ONE TIME



SCHEMATIC PLANT ASSEMBLY

The above sketch gives you a general view of the placement of the various units that comprise the plant.

For the Prospective Gas Manufacturer this complete plant layout provides for extremely *simple* operation and exceptionally *low* maintenance costs. The entire plant is designed to provide ample storage room for filled tanks and compact enough for the Chief operator to observe all operations. Rated capacity, 2700 cu. ft. per hour.

INDEPENDENT ENGINEERING COMPANY, Inc.

CONSULTING · RESEARCH · DESIGNING

Manufacturers of

CYLINDERS AND GAS PRODUCING EQUIPMENT
ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

O'FALLON, ILLINOIS

WE INVITE YOUR INQUIRIES

For BETTER • • MORE EFFICIENT SILVER BRAZING

USE THE NEW

FLUX-POT for FAST EFFICIENT FLUX HANDLING

Unit complete with 6-ft. rubber cord and plug.

Fully automatic thermostat control set to keep flux at constant 180° temperature.

This pot provides a low-cost labor and material saving means of handling flux for Industrial Silver Brazing. ECONOMICAL . . . will pay its original cost in a short time by increasing brazing efficiency and output. Enables the user to extend volume of usable flux by 20% water dilution with practically no splash loss. GET DETAILS NOW!

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Kansas City 2, Mo. • 227 Werby Bldg., 39th & Main Sts.

EASY REMOVAL of flux claimed for recovery unit for automatic welding installations

Flux-Recovery Unit

NEW flux-recovery machine has a tank composed of two parts of heavy-gauge steel. Incoming flux drops in the lower tank, while the fine dust and dirt adhere to a dust bag inverted in the top of the upper tank. The bag is also said to prevent any dust or flux from passing through the fan or motor.

At the side of the bottom tank is a door or valve to draw off flux. Opening is high enough for a standard pail or bucket to be placed beneath it. It is not necessary to open the tank in order to remove flux. A 5-mesh screen over the bucket will collect large pieces of slag that are sometimes mixed with the flux. Machine is mounted on 12-in. diameter rubber-tired wheels and is equipped with a ¾-hp 110-volt a-c/d-c motor and 40 ft of cable. THE KENT CO., INC., Rome, N. Y.

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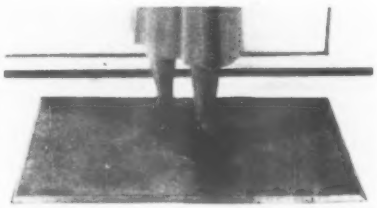


SPONGE RUBBER mats provide better footing for workers and reduce floor noise

Rubber Mats

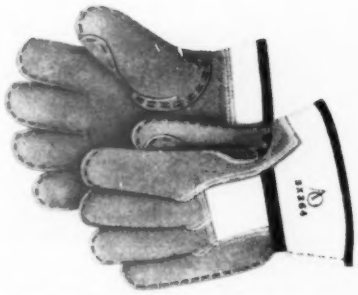
A LINE of sponge rubber mats and runners is being produced by ATLAS SPONGE RUBBER CO., 806 East 61st St., Los Angeles 1. Standard mats are made of resilient sponge rubber ½ in. thick by 21½ by 47 in. Runners come in 47-in. lengths. Advantages claimed for the use of rubber mats are safety, reduction in floor noise and breakage.

* * *

Fluxed Rod for Copper

AN internally fluxed rod called "Silbrax" is offered by Arcos Corp., for gas welding of deoxidized copper. It may also be used as a filler rod for carbon-arc and inert-arc welding.

The self-fluxing property is said to prevent repeated rod oxidation. The heat is applied first to the metal and then transmitted to the internal flux. Samples will be sent on request. ARCOS CORP., 1500 South 50th St., Philadelphia 43.



STEEL-SEWED seams featured on heavy-duty gloves for handling castings, rough fabrications

Gloves

HEAVY-DUTY glove for handling rough stock, castings, grinding and similar work is made of treated chrome-tanned cowhide and has canvas back with elastic strap. Seams are steel-sewed, and the seam along the forefinger has been eliminated to give longer glove life.

Wearing surface of the palm has been increased by extending the palm, and there is no bib patch. The steel-stapled strap at the thumb crotch fortifies this part of the glove. A steel-stapled patch is also provided on the face of the thumb. AMERICAN OPTICAL CO., Southbridge, Mass.

* * *

HOLDING plate for odd-shaped workpiece comes in 6 and 9 in. square sizes

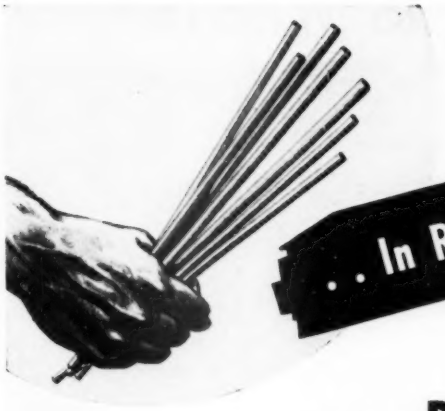
Angle Plates

EASY set-up of jobs difficult to hold in a vise is claimed for the Palmgren adjustable angle plate. Eight bolt slots are provided to hold workpieces for welding, soldering, drilling, etc. The plate may be adjusted to 90 deg and locked by support screws. Two sizes are available in 6 and 9 in. square sizes. Bases are provided with bolt lugs for fixing the angle plate to tables or benches. CHICAGO TOOL AND ENGINEERING CO., 8383 South Chicago Ave., Chicago 17.

* * *

Electrode for Cast Iron

ELECTRODE for cast-iron repairs is claimed to be machinable and have high tensile strength. Called "Eutectrode 24/29," it has a new formula flux coating for low heat applications. The 5/32-in. electrode is claimed to weld cast iron at 80-100 amp. It may be used with a-c or d-c, straight or reverse polarity. EUTECTIC WELDING ALLOYS CORP., 40 Worth St., New York City 13.



. . In Repair Welding

ONLY **BRONZE**

OFFERS ALL OF THESE

Advantages:

CAN BE APPLIED TO A WIDE RANGE OF MATERIALS

Mild Steel — Cast Steel
High and Low Carbon Steel
Wrought Iron — Grey Iron
Brass Bronze Copper
Malleable Iron Castings
Chrome and Nickel Cast Irons and many others

EASILY AND QUICKLY APPLIED

Uniform and Easy Tinning
Pre-heating or post-heating for stress relief are not necessary
Low melting point
Pre-cleaning can be eliminated with certain types of rods
Bronze welds are easily machined

BRONZE WELDS ARE DEPENDABLE IN SERVICE

Superior bonding properties
High strength
Excellent wear resistance (to reasonably hot or cold pressures)
Corrosion resistant

TITAN Bronze Welding Rods are supplied in several types to meet every requirement for oxy-acetylene welding. All are carefully deoxidized to assure ductile, high-strength, non-porous welds. Write for complete information.

TITAN Metal MANUFACTURING CO.
GENERAL OFFICES AND PLANTS
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Brass and Bronze Rod · Forgings · Die Castings · Welding Rods

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USE **TUF-COTE**

STOPS

Welding spatter and grinding wheel pitting

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*One TUF-COTE lens will replace seven to fifteen uncoated lenses.

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BBB KEEN-ARC CARBONS . . .

the accepted "Standard" for Twin-Arc Torches

Specified as "standard" by many of the leading manufacturers of Twin-Arc Torches (and approved by all original equipment makers) BBB Keen-Arc Electrodes have kept pace with twin-arc progress since the first introduction of the new technique.

They produce a fine-grained weld of high tensile strength — a steady flowing flame which does not wander and which is concentrated at the desired focal point. Heavy copper coating permits gripping at the extreme ends—eliminates frequent re-setting. For excellent results—*every time*—specify BBB Keen-Arcs by name.

Write us for samples and prices of both Keen-Arcs and the newly improved BBB Standard Welding Electrodes.

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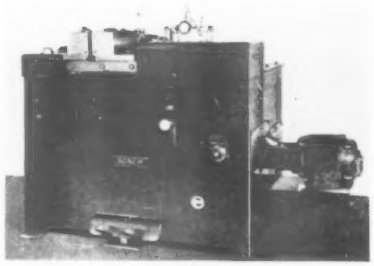
3450 SOUTH 52nd. AVE. CICERO 50, ILL.



REPLACEABLE insert dies are used in 50 kva Agnew hydraulic flash welder

Flash Welder

NEW hydraulically operated flash welder, type HAB, is automatic except for loading and unloading. The hydraulic pump supplies the pressure to actuate the platen, and a flow valve controls the flash cycle. Air is used for clamping.

Machine comes equipped with 50-kva transformer and clamps, magnetic contactor and pressure controls. Dies are replaceable inserts. The welder has a shipping weight of 2,000 lbs. Height to platen is 36 in. and a floor space of 3 by 4 ft is required. AGNEW ELECTRIC CO., Milford, Mich.

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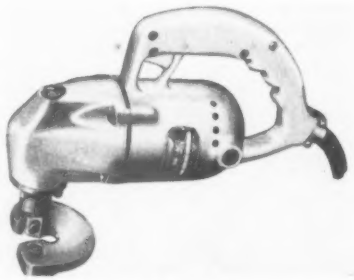


12-GAUGE METAL can be cut with new portable shear. Will cut on 1½ in. radius

Portable Shear

A NEW portable tool called the "12 Gage Porto-Shear" is claimed to cut 12-gauge sheet steel. It will cut two gauges thinner in Monel or stainless, and approximately 50% above the 12-gauge rating in sheet copper, aluminum, lead and other non-ferrous metals.

Cutting blade will cut on a radius as small as 1½ in. Rapid reciprocating action of 1,100 strokes per minute of the vertical blade against the stationary horizontal blade makes a clean smooth cut without burrs or ragged edges. Handle contains an instant release trigger switch. Standard equipment includes a set of shear blades, a set-screw wrench, and a three-wire cable and plug. THE BLACK AND DECKER MFG. CO., Towson 4, Md.

* * *

Hand Cutters

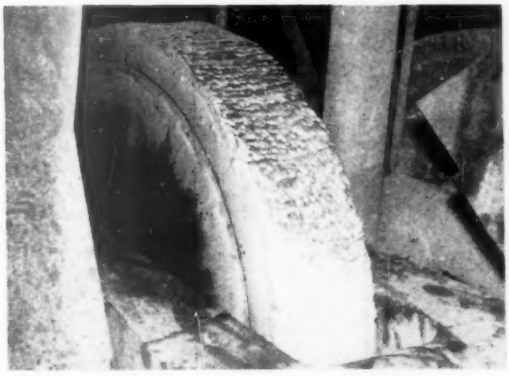
NEW trio of hand tools for cutting wire, rod, bolts, etc., includes a shear cutter, wire cutter and angle cutter—all having red plastic handles. Shear cutter cuts steel strapping, wire stay and box wire. Wire cutter cuts soft wires, rods and ¼-in. bolts. The angle cutter does close cutting of cotter pins, rods, bolts, etc. H. K. PORTER, INC., Somerville 43, Mass.

* * *

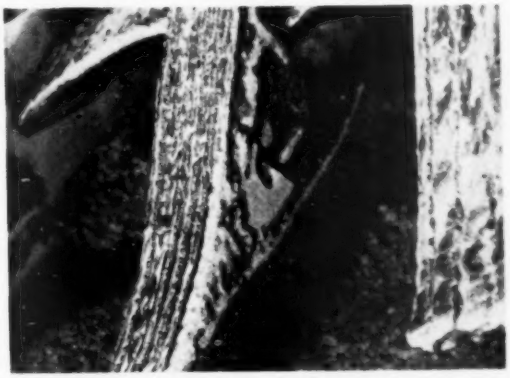
WANTED!

HARD-FACING JOBS THAT REQUIRE QUICK BUILD-UPS...LONGER ABRASION RESISTANCE

Bare STOODY SELF-HARDENING **21,** a new, fabricated Stoody Alloy, fills all requirements for protecting heavy equipment against abrasive wear. It has the fastest burn-off rate of all low-cost alloys, makes heavy build-ups in a single pass. Its extreme abrasion resistance is due to the high alloy content (21%). Burns either A.C. or D.C., handles as easily on D.C. equipment as coated rods. Deposits are free from spalling—stay put even when shock is present. Bonds readily with manganese steel, cast iron, or common steels.



4 TIMES MORE WEAR Bare Stoody Self-Hardening **21** kept this Muller Tire operating 4 times longer than an unprotected tire.



ABRASION RESISTANCE WITH SHOCK Welded as stringers on these Bucket Teeth, Stoody Self-Hardening **21** doubled the service.

TRIPLE LIFE was obtained on this Portable Roll Crusher by switching hard-facing alloys. Stoody Self-Hardening **21** cost a fraction of former alloy used and eliminated spalling.

PUMPING SILT-LADEN WATER an unprotected Dredge Pump Casing takes severe wear. Stoody Self-Hardening **21** licks the problem.

If you have large equipment subject to abrasive wear, specify STOODY SELF-HARDENING **21.** Your welders will appreciate its freedom from slag interference, its wide amperage latitude and exceptional welding speed. A 50 lb. trial order will prove its wear-proofing advantages. Call your Stoody Dealer for information and literature or write direct to...

STOODY COMPANY
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FLUXES
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1100
LOW TEMPERATURE
FLUX

Best for brush application and lowest melting solders. It's smooth as cold cream — doesn't lump or harden and removes readily in cold water. You'll find No. 1100 easy and convenient to use on both ferrous and non-ferrous metals.

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Universal because equally good for dipping and brushing, lower or higher temperatures. A superior all-purpose flux for production brazing of ferrous and non-ferrous metals. Doesn't rise or glare.

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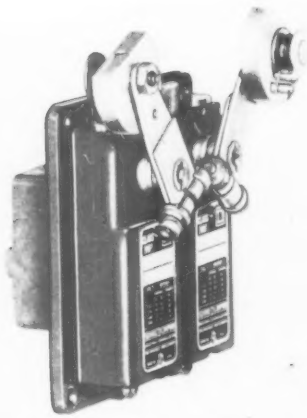
NEWARK 5, N. J.



ELIMINATION of extra fittings claimed with new duplex limit switches rated at 600 volts

Limit Switches

Two new duplex limit switches enable the use of only one run of conduit for necessary control wires. Extra conduit and fittings between individual switches are eliminated. Both surface-mounting and flush-mounting types are available. Each switch has a single-pole, double-throw snap-action mechanism and two electrical circuits.

Switches are available with either two push rods, two plain roller arms or two one-way rollers. Return springs can be readily changed for the reverse direction of operation. Switches are rated to 600 volts, a-c or d-c, and will operate in temperatures up to 200 F. SQUARE D CO., 4041 N. Richards St., Milwaukee 12, Wisc.

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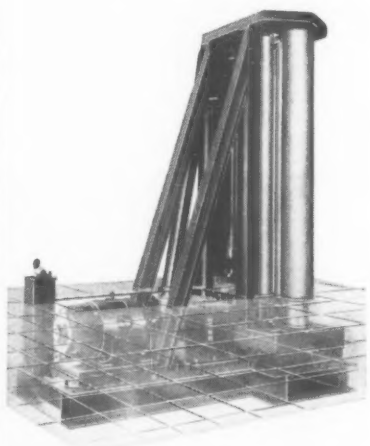


TRUE DIAMETERS are said to be achieved in cylinders made by vertical bending rolls

Vertical Bending Rolls

To augment its horizontal-type plate bending rolls, Webb Corp. has added new vertical rolls for use in rolling large-diameter cylinders of light plate. The sheet, handled with a jib crane, is inserted on edge into the machine. Diameters are said to be more accurate because the horizontal stress on the rolled plate has been greatly reduced. THE WEBB CORP., Webb City, Mo.

Results

Without Fuss or Noise

. . . that is why P&H "PF" electrodes are selected by welding experts to reduce costs on poor-fit work

The **6012 "PF"** electrode is a good one to have on your production team. Like any good team player, "PF" makes such easy work of irregular and poor-fit jobs that the low figures on your time sheets are almost unbelievable. With fast burn-off rate, "PF" operates quietly — there is no noisy fuss, bothersome sparks, or annoying spatter. This is the kind of efficiency you need in your shop — the kind of action that your welders appreciate; just ask them.

In addition to "PF's" quiet efficiency, experts also recognize the following features as important in keeping costs down:

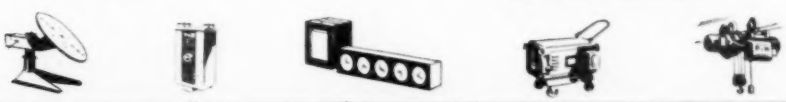
Rapid solidification — It is the fast-setting characteristic of "PF" that makes it so excellent for all poor-fit-up work.

Fast performer — "PF" gets the work done in a hurry. Its ease of handling, and high deposition rate — the ability to withstand high welding current, low spatter, and easily-removed slag—all contribute to reduced time and lower costs.

Excellent for sheet metal also — "PF" is a good general-purpose rod that can be used in all positions. Not only is it superior for poor-fit-up work, but it also achieves excellent results on sheet metal.

Get out your toughest poor-fit problem and let a P&H representative or distributor show you how "PF" will save you time and money. Write us for literature.

P&H WELDING ELECTRODES
4513 W. National Avenue
HARNISCHFEEGER CORPORATION



Welding Positioners | AC Welders | Welding Production Control Systems | DC Welders | Electric Hoists

BETTER, EASIER, SAFER

*Snap-tite

TRADE MARK REG. U.S. PAT. OFFICE

THE WELDING HOSE COUPLER THAT'S UNDERWRITER APPROVED

BETTER

because you don't have to shut off the gas at the tank. Snap-Tite couplers have built-in valves that close automatically when the torch is disconnected.

EASIER

because you disconnect the torch by hand . . . quickly, safely. No wrench is needed. And you eliminate cross threading . . . leaky connections . . . kinking.

SAFER

because Snap-Tite Couplers passed Underwriters' Laboratory tests with plenty to spare.

GET THE FULL STORY NOW. Ask your distributor for a demonstration . . . or write the factory.

What zippers are to clothes SNAP-TITES are to hose

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*Snap-tite

TRADE MARK REG. U.S. PAT. OFFICE

ERIE, PENNSYLVANIA

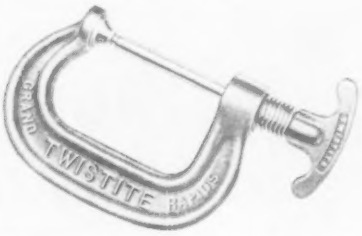
PUSHBUTTON operation featured on goggle-cleaning station. Cabinet has 400 tissues

Goggle Spray Dispenser

NEW handy spray dispenser is a 4 by 7 by 10 in. steel cabinet containing a 12-oz bottle of "Sani-Spray" and 400 wiping tissues. Pressure for the spray is obtained by connecting the dispenser to the plant air line. Welding and safety goggles and welding lenses can be readily cleaned by this method.

The dispenser eliminates rubber bulbs (which are liable to crack), eliminates handling of goggles with greasy hands, provides a tamperproof case and a rust-proof brass atomizer. ALLEN OPTICAL CO., SANI-SPRAY DIVISION, Buffalo, N. Y.

* * *



ECCENTRIC spline allows easy locking and unlocking in the new C-type weld clamp

Weld Clamps

NEW C-type clamps employ a push-pull design that sets the pressure bar in any position from full open to full closed. An eccentric spline arrangement enables the operator to lock or unlock the pressure bar with one twist.

Advantages claimed are: frame distortion prevented by safety roller clutch; material is not marred and will not move because of ball-bearing foot; deep-throated frame; available in malleable or heat-treated aluminum in sizes from 2 to 6 in.; no exposed threads and a spatter-resisting rod and frame. The safety clutch is said to prevent frame distortion from welding heat. RICHARDS INDUSTRIES, INC., Grand Rapids, Mich.

* * *

All-Purpose Electrode

AMERICAN AGILE CORP. is producing an improved "Blue-Red" electrode, an E-6013 rod for general purpose, a-c/d-c, all-position welding. A 5/32-in. electrode is said to perform well at settings of 110 to 260 amp without porosity and breakdown of coating. Slag is said to be brittle and easy to remove. Physical properties of deposit are: tensile strength, 65,000 to 72,000 psi; elongation in 2 in., 18 to 26%. AMERICAN AGILE CORP., DEPT. L, 5806 Hough Ave., Cleveland 3.

UPRIGHT tank with motor and compressor on top saves floor space. 200 psi pressure

Vertical Compressor

GRIMES, Co., Dallas, Tex., has developed a new welded steel vertical air compressor. Space-saving motor and compressor unit is mounted on the upright tank. Three models have been developed, with 20 and 30 gal tanks and air displacements up to 4.07 cu ft of air per minute. Largest model requires only 24 in. diameter of floor space. Welded tank is tested to 400 psi and has a working pressure of 200 psi.

* * *

Alloy Wire

"HASTELLOY" and "Multimet" alloy drawn wire—for welding and metal-spraying is now available in sizes down to 0.050 in. from HAYNES STELLITE CO., Kokomo, Ind. Sizes below 0.060 in. are supplied by an associate company, KEMET LABORATORIES CO., INC., Madison & West 117th St., Cleveland, O. The wire is furnished in coils or in cut and straightened lengths, either bare or flux-coated.

"Hastelloy" alloys are nickel-base alloys developed to resist chemical corrosion. Alloy B is resistant to hydrochloric acid. Alloy C is suitable for applications involving oxidation. "Multimet" alloy is for use at elevated temperatures and is claimed to have tensile properties comparable to high-strength steels.

* * *

Electrode for Monel

ARCOS "Monend 806" electrode is recommended for welding Monel, Monel-clad and for overlaying steel. It is said to eliminate the necessity of depositing a buffer layer of nickel.

Claimed to facilitate all-position welding, the electrode is said to produce deposits that combine high elongation values (normally 50% or higher) with a yield strength of 42,500 psi and a tensile strength of 75,500 psi. ARCOS CORP., 1500 South 50th St., Philadelphia 43.

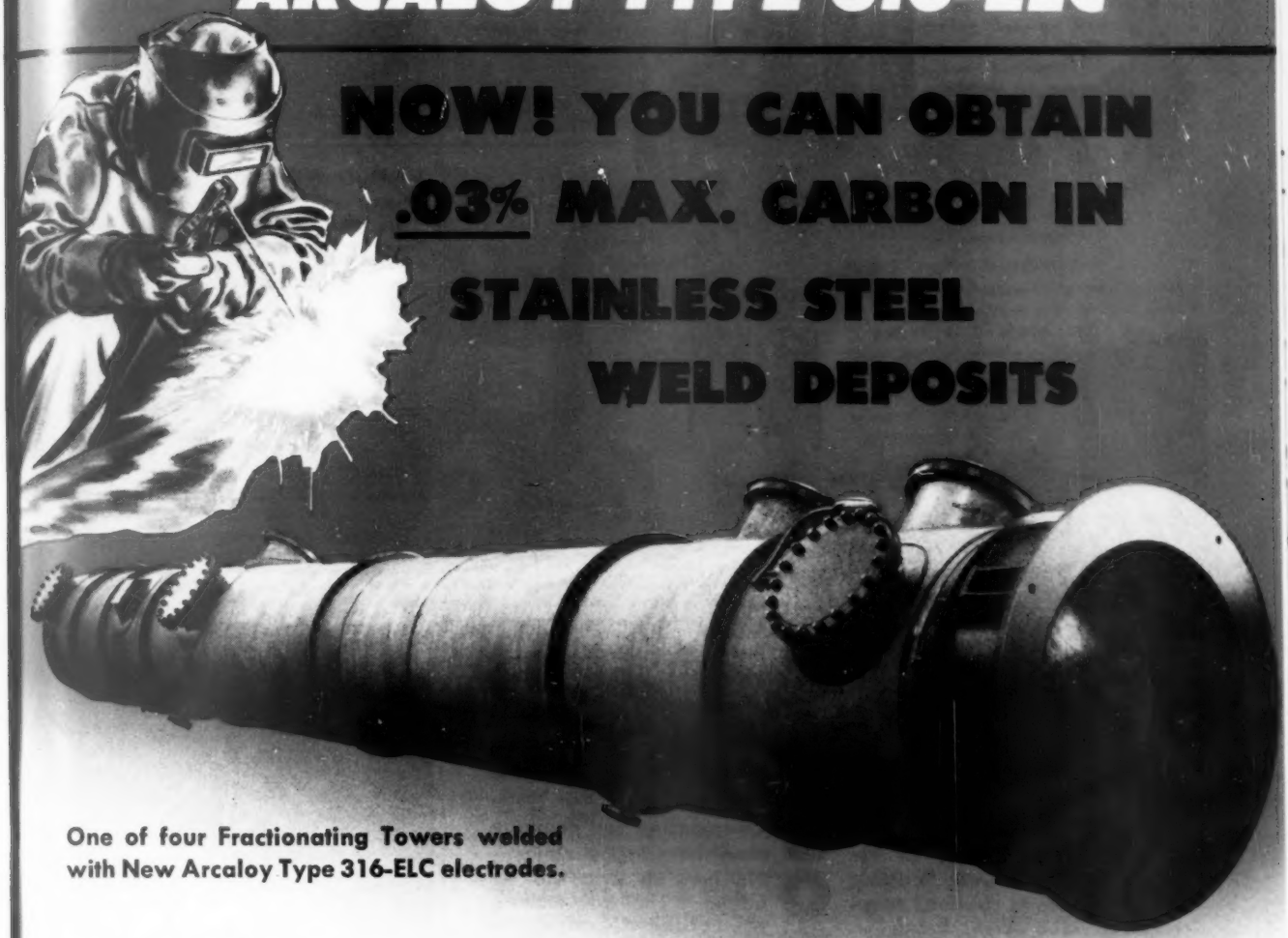
* * *

Welded Hacksaw Blade

A NEW hacksaw with a high-speed edge welded to a tough steel back has been introduced by the MILLERS FALLS CO., Greenfield, Mass. Cutting costs are said to be reduced 20 to 50% when this blade is used since the blade may be put under greater tension, used at faster speeds and at greater feed pressures. The new welded blade comes in lengths from 12 to 30 in. in widths from 1 to 2½ in. and in thicknesses ranging from 0.049 to 0.100 in.

ARCALOY TYPE 316-ELC*

NOW! YOU CAN OBTAIN .03% MAX. CARBON IN STAINLESS STEEL WELD DEPOSITS



One of four Fractionating Towers welded with New Arcaloy Type 316-ELC electrodes.

An Alloy Rods Co. customer for 10 years, the Steel and Alloy Tank Co. of Newark, N. J., needed a type 316 analysis electrode with carbon deposit of .03% max. in the weld! The result is the new Arcaloy Type 316-ELC—which produces stainless steel welds with the *lowest carbon* deposit in welding history!

This new electrode was used in the construction of four fractionating towers (one shown here) . . . each 59 feet long, 6 feet in diameter, with ¼ inch walls. With Arcaloy Type 316-ELC, the welds had increased high resistance to corrosion . . . extremely important in this application.

Arcaloy Type 316-ELC is the result of Alloy Rods Co.'s continuing research and development which helps you by constantly *improving* standard electrodes and *developing* new and better ones. For more specific information on Arcaloy Type 316-ELC, or any other Alloy Rods Co. electrodes . . . for welding stainless steel, mild steel, cast iron, tool steels and various alloys, write today to: Alloy Rods Co., Department B-3, York, Pennsylvania.

★ Extra Low Carbon

Look for the *FLAMING-ARC* Trademark

Alloy Rods Co.
York, Pa.

All sub-assemblies of this 6-story galvanized iron ventilator stack were positioned for welding and turned toward welder. The operator held electrode slightly off-center in direction of rotation.

Good Welds on galvanized metal are quick and easy with Ampco-Trode 10

Profit from the experience of a large southern producer of galvanized and light-metal fabrications. This company found it could do a better job on a six-story galvanized ventilator stack — saving both time and money — by welding with Ampco-Trode 10.

The stack was made of 11-gauge galvanized iron. Welding (in preference to riveting) saved time and metal weight. Using 1/8" Ampco-Trode 10 electrodes (in preference to steel) gave them four additional advantages:

1. Burn-off of the coating adjacent to the weld was held to a minimum. The weld deposit itself is rust-proof.
2. The braze-welded bond is as strong and ductile as the galvanized iron base-plate.
3. Undercutting and resulting weaknesses were eliminated.
4. No back-up strip was required. The low melting point of the weld metal gave penetration sufficient to produce a small, uniform inside bead for a sound weld.

Other Ampco bronze electrodes such as Phos-Trode and Sil-Trode can also give you simple, successful welds (smooth, free from pitting and porosity) on galvanized pipe, depending on your service requirements. Ask your Ampco distributor for his recommendations on your specific needs today.

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Ampco Metal, Inc.

Dept. WE-2 • Milwaukee 4, Wisconsin

FREE! Complete information on Ampco-Trode welding electrodes!

Tear out this coupon and mail today!

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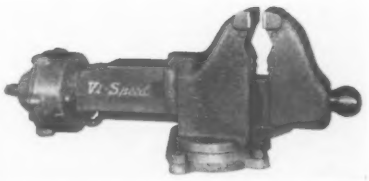


THREE TONS of pressure exerted by vise. Jaw width, 6 in., max. opening, 11 in.

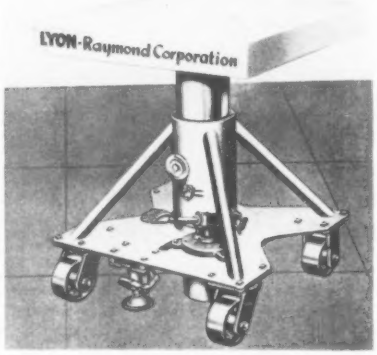
Air-Operated Vise

THREE new models of air-operated vises are offered for use in weld-fabricating shops, machine shops, etc. Models 610-D, 1000 and 1000-D provide a continuous, regulated grip for small production pieces, large castings, fabrications and piping. An air regulator valve allows adjustment of jaw pressure from 0 to 7,500 lb.

Specifications of Model 1000 shown above include: overall length with jaw closed, 37 in.; height, 15 in.; jaw width, 6 in.; maximum opening, 11 in.; recommended air pressure, 15 to 150 psi.

Controls included with each vise are: foot pedal, pressure regulator, pressure gauge, quick release valve, two lengths of coupled hose and handle for manual operation. VAN PRODUCTS CO., 1528 Erie Trust Bldg., Erie, Pa.

* * *



ELEVATING table has 4,000-lb capacity, 14 in. lift range. Low height 28 in.

Lifting Table

NEW hydraulic elevating table has a capacity of 4,000 lb. The top revolves or can be locked in a fixed position. The table has a 14-in. range of elevation; low height is 28 in. and elevated height 42 in. Top is 30 in. square.

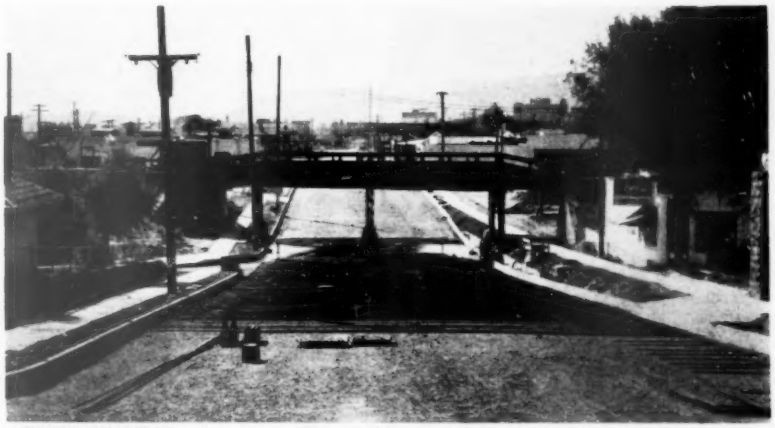
Two ball-bearing swivel casters and two rigid casters with 6 in. wheels and roller bearings provide portability. A pedal release valve controls the lowering speed and holds the top at any selected position. Table is recommended for handling heavy sheets in welding, grinding and other shop work. LYON-RAYMOND CORP., 6853 Madison St., Greene, N. Y.

* * *

Jet Torch Tip

NEW small jet tip for light welding and cutting is being manufactured by the MODERN ENGINEERING CO., 3401 Pine Blvd., St. Louis 3, Mo. Called the "MECO Aviator Jet," it is designed for use with the MECO "Aviator" torch to enable the operator to increase his range of work.

News of the Industry



HEATED HIGHWAY underpass near Klamath Falls, Ore., does away with dangerous ice and snow conditions. Water heated to 160 F by a nearby underground hot spring circulates through 15,000 ft of welded wrought iron piping buried in the roadway. System melts 1 in. of snow/hour

Radiant Heating Keeps Road Snow-Free

A HIGHWAY leading into Klamath Falls, Ore., is being heated this winter by an underground spring. The hot water is circulated through a network of welded wrought-iron pipe laid in the concrete. A dangerous road area, four lanes wide and 450 feet long with an 8% grade, is thus kept skid-free in icy weather. The highway radiant heating system is able to melt up to one inch of snow or one-tenth inch of ice per hour.

The stretch of heated pavement is on the Dallas-California Highway leading into Klamath Falls from the north. A coil of 2-in. pipe is submerged deep in the nearby hot well, water of which tests at 190 F. This coil carries a sealed-in supply of water and anti-freeze solution, which is heated to about 160 F. by immersion in the hot well and pumped through a 2-in. main. The main runs from the well up to the pavement and parallel to the road for 400 ft. In the pavement slab are embedded 15,000 feet of ¾-in. wrought-iron pipe grids. Each of the 15 grid panels is connected to the main by valves to insure and even flow of water. The main, the series of grids and the well coil comprise a closed circuit through which the heated water is pumped to warm the whole 8-in. slab of road concrete to snow-melting temperature.

* * *

Western NWSA Meeting Feb. 22 at San Francisco

THE WESTERN zone meeting of the National Welding Supply Association will be held in San Francisco on February 22. Commencing at 10 a.m., the meeting will be in the St. Francis Hotel.

Hal Savage, Arizona Welding Supply Co., Phoenix, Ariz., who is western zone vice-president, will be chairman.

Canadian Firm Consolidates With P. R. Mallory & Co.

P. R. MALLORY & CO., INC., Indianapolis, and Johnson Matthey Co., of Toronto, Ontario have formed a new Canadian organization to be known as Johnson Matthey and Mallory Limited. Its location is at 110 Industry St., Toronto 15. In addition to the line of precious metal products for the industrial and jewelry trades made by Johnson Matthey, the new firm will also manufacture the Mallory line of metallurgical products including resistance-welding electrodes, electrical contacts and special products fabricated from tungsten, molybdenum and other refractory metals.

* * *

Burdett Installs New Oxygen Unit

LARGEST oxygen producing unit in the 25-year history of Burdett Oxygen Co., Cleveland, went into operation in January. More than twice as large as any other Burdett unit, it will produce more than five million cubic feet of oxygen per month.

Increasing demands of customers in steel mills and foundries will absorb the increased production. The gas will be handled in bulk containers. The new unit is also capable of producing nitrogen and argon gas.

* * *

97 Men Go 278,000 Hours Without Welding Accidents

A RECORD of 278,978 man-hours without a lost-time accident has been established by pipe-fabricating weldors at the St. Louis plant of Midwest Piping & Supply Co., Inc. A certificate in recognition of the safety record was recently presented to the 97-man department by the American Mutual Liability Insurance Co.

Worthington Pump Operates Ransome Machinery Plant

MANUFACTURING and distributing activities of its subsidiary, Ransome Machinery Co., are now being conducted by the Worthington Pump and Machinery Corp. Manufacturing operations are being continued at the Dunellen Works, Dunellen, N. J., but sales activities will be directed from Worthington's executive offices at Harrison, N. J., through the Ransome sales division at the Dunellen Works.

* * *

Program Announced For Purdue Conference

THE ANNUAL welding conference sponsored by Purdue University will be held Feb. 8, 9 and 10 at Lafayette, Ind. There are three general sessions. On Tuesday, Feb. 8, resistance welding papers will be presented. Wednesday will be devoted to non-pressure welding in production, and Thursday to welding methods of interest to maintenance and job shop operators.

A night meeting on Wednesday will feature a talk by T. B. Jefferson, editor of THE WELDING ENGINEER, on "What Welding Means to America." Purdue University officials and a national officer of the American Welding Society will give short talks at the meeting.

All meetings will be held in Room 101, Michael Golden Laboratories, on the campus.

The conference is sponsored by the university's department of general engineering and the division of technical extension at the university with the co-operation of the engineering schools and nearby chapters of the AWS. Information about the program or exhibits may be obtained at Division of Technical Extension, 209 Service & Stores Building, Purdue University, Lafayette, Ind.

* * *

R-W Distributorship Organized in Cleveland

ERNEST H. LAUTER and George Omelianoff have organized the Progressive Welder Sales Co., 5713 Euclid Ave., Cleveland, for the distribution of resistance-welding equipment. Territory will include eastern Ohio, western Maryland, western Pennsylvania, and northern West Virginia.

Mr. Lauter has been a manufacturer's representative for 15 years for leading welder manufacturers. He is a graduate of both Case School of Applied Science and the University of Southern California. Mr. Omelianoff is an engineering graduate of the University of Detroit. For the past five years he was an applications engineer with Progressive Welder Co., Detroit.

* * *

1948 Steel Output Largest in Peacetime

MORE than 88,000,000 tons of steel were produced during 1948, the largest amount of raw steel in any peacetime year and more than half of the whole world's output. The total 1948 tonnage lacked only a few days' production of reaching the 1944 wartime record output of steel.

The steel tonnage represented about 94% of all metals produced in the United States last year, according to the American Iron and Steel Institute.

for dependable
PERFORMANCE

"FLUXINE" Fluxes are the result of over fifty years of scientific research into the metal-joining field. There are 89 FLUXINE Fluxes . . . one for every welding, silver soldering, brazing, and soft soldering operation . . . each with its own properties, designed for a particular metal-joining operation. All have been perfected not only for highest efficiency, speed, and long life, but for economy and safety as well. FLUXINE Fluxes produce no injurious fumes to irritate eyes or nose of the operator.

Write on your company letterhead for a generous sample stating which FLUXINE Flux you desire.

KREMBS & COMPANY
(Est. 1875)
Dept. G, 669 W. Ohio St., Chicago 10, Ill.

No. 4 FLUXINE. in powder form, for welding cast iron with bronze rods.

No. 7 FLUXINE for welding all types of aluminum.

No. 18C FLUXINE for gas and atomic hydrogen welding of stainless steels and inconel.

No. 41 FLUXINE used with high-melting silver solders on copper and its alloys and on steel.

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No. 43 FLUXINE . . . non-glaring . . . used when low-melting silver solders are specified. No injurious fumes. Goes further than most fluxes.

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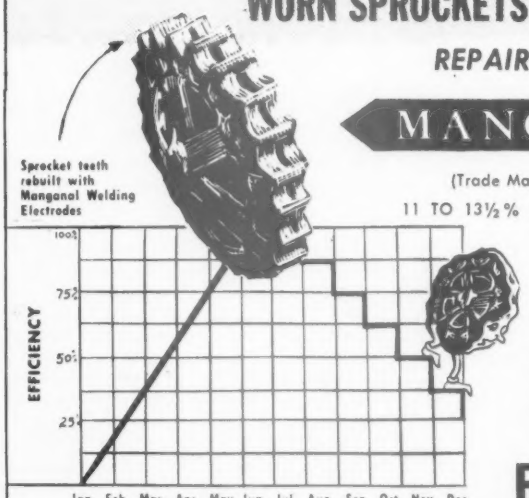
11 TO 13½% MANGANESE-NICKEL STEEL



Bare or Special Tite-Kote WELDING ELECTRODES

WRITE FOR YOUR FREE COPY OF THE "MANGANAL MARKETER"

Weld deposits made with MANGANAL WELDING ELECTRODES *wear longer*. They are genuine Manganese-Nickel Steel, with alloys in the rod itself, not in the coating. MANGANAL deposits workharden up to 550 Brinell under impact and abrasion and polish in use, cutting wear on steel which contacts them. MANGANAL'S high tensile strength (up to 15,000 p.s.i.) prevents spalling. Extreme toughness for outlasts other steels. Produced in 1/8", 5/32" 3/16" 1/4" and 5/16" diameters, 18" lengths; 50 lb. packages.

NAME OF NEAREST DISTRIBUTOR ON REQUEST

STULZ-SICKLES CO.
SOLE PRODUCERS
91 N. J. Railroad Ave. Newark 5, N. J.

A. F. Davis Award Contest Deadline Is April 1

CLOSING date for entries in the A. F. Davis Undergraduate Welding Award program sponsored by the American Welding Society is April 1. The paper must be published in a college undergraduate publication before that date.

Six copies of the publication must be received at the office of the American Welding Society, 33 West 39th St., New York City 18, before 5 p. m. on April 10, 1949.

Awards include $200 to the author of the best paper and the same amount to the publication in which it appeared. Second prize is $150 with a like amount to the paper publishing it.

Subject matter of the papers may be on any phase of any type of welding or its application to design and construction.

* * *

Akron Bridge Delayed By Lack of Weldors

EXPERIENCED arc-weldors are needed to work on the new High Level bridge at Akron, O. The shortage of men for the job was first reported by Bethlehem Steel Co. and confirmed by C. M. Newhall, state highway project engineer in charge.

Failure to pass rigid state tests for quality welds has barred many men referred to the job by the Structural Iron Workers Local 17 (AFL). The tests include sample welds which are sent to the highway department testing laboratory at Columbus. There, the welds are machined and broken to test their strength.

Weldors who are shop-owners cannot be hired, engineers on the job have reported, because all applicants must be certified by the union.

Steel deck mats for the bridge are 6 by 28 ft and each require about 26 ft of weld metal. Mats are welded to the bridge stringers, to each other and to steelmedian strips in the center of the bridge.

* * *

How-to-Start Welding Shop Told in New Booklet

A new 64-page booklet entitled "How to Start and Operate a Profitable Welding Business" gives specific suggestions and plans for starting a job welding shop. Each chapter covers an important phase in the operation of the shop. Many photos illustrate the opportunities and hints given in the text. Ideas for blacksmith shops, auto repair shops, sheet metal shops, machine and tool shops and ornamental iron works are also included. For copies of the booklet send 10 cents (to cover postage and handling) to the Hobart Brothers Co., Hobart Square, Troy 1, O.

* * *

G-E Motor Factory At San Jose, Calif.

A $3,000,000 motor manufacturing plant, which at peak production will be able to turn out more than 1,500 electric motors per week, was recently opened by the General Electric Co., at San Jose, Calif. The factory ultimately will produce all of the company's output of single-phase capacitor integral motors.

Southwestern NWSA Members Meet at Dallas, Tex.

HOTEL Adolphus, Dallas, Tex., was the meeting place for southwestern zone members of the National Welding Supply Association on December 15. Twenty-seven members and guests were in attendance. Howard R. Proctor, Acme Welding Supply Co., Houston, southwestern zone vice-president, was chairman.

James N. Alcock, Saginaw Welding Supply Co., Saginaw, Mich., discussed "Our Experience in Modern Merchandising." He reviewed such points as selection of proper location, physical arrangement and display, compensation of salesmen, inventory control and manufacture of sales literature.

"Will the New Line Pay?" was the subject of an informative discussion by Charles E. Groves, Texas Welding Supply Co., Dallas. Prospective volume of a sales territory should be carefully checked, he advised, before taking on a particular line.

Six new members joined the association, bring the total NWSA membership to approximately 150. Distributor members in attendance at the Dallas meeting were: James N. Alcock, H. W. Cessna, T. C. Glassman, Charles Graves, R. G. Harrison, E. W. Hanna, A. L. Hill, A. J. LeBlanc, G. P. Modlish, J. D. Morris, Jr., Howard Proctor, Charles O. Stilwell and George Wiley.

* * *

Wins Big Prizes In Marquette Contest

W. L. TAYLOR, distributor salesman of L. S. Jullien, Inc., Washington, D. C., hit the jack pot in a prize drawing conducted by the Marquette Mfg. Co., Minneapolis. To qualify, the salesmen had to sell Marquette welders and battery chargers. Mr. Taylor, the holder of the lucky number, won $500 in cash and $2,000 worth of merchandise including a 16-cu ft home freezer, a refrigerator, radio-and-phonograph combination, two bicycles and an outboard motor.

Edward Younes, sales manager of the same firm also received a 16 cu-ft-home freezer. Other salesmen across the nation received from one to five prizes each as they qualified in the same contest. Bonus prizes of Nylon stockings were awarded to salesmen's wives.

Drawing was made by Marvin E. Kline, director of the Sister Kenny Foundation, Minneapolis. A home freezer unit was accepted by Mr. Kline in behalf of the polio patients of the foundation.

* * *

Jet Engines Shipped In Magnesium Mounts

WEIGHT-SAVING magnesium has been found useful in a new role as shipping mounts for J-33 centrifugal-flow jet engines. These welded mounts were drop tested with a dummy engine by raising each end of a mount alternately a maximum of two feet from a concrete floor and allowing it to fall freely. The results demonstrated that the strength of a magnesium mount was close to one fabricated of steel, at a 60% saving in gross weight.

SPEER Cuts

Carbon Arc Costs

Cutting rivets, scrap steel, cast iron, lead; burning holes in plates for welding on tube fittings, connections, etc. by carbon arc is generally faster and more economical than by gas torch. That's because carbon arc produces more heat, costs less to operate.

For greater economy in all your carbon arc work, specify Speer Carbon Electrodes. Their high density provides greater current-carrying capacity, produces more heat at less cost. They are 22% harder and stronger by actual test, take more abuse and shock in cutting and welding operations... give you 33% longer electrode life.

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"WELDING DESIGN HANDBOOK"

7 chapters containing complete data for those engaged in welding design. In addition to consideration of basic design problems, there is included a number of single pages of data. These are grouped to give pertinent data on welding processes, weld joints and stresses, welded design, cost, materials, pipe data and engineering tables.

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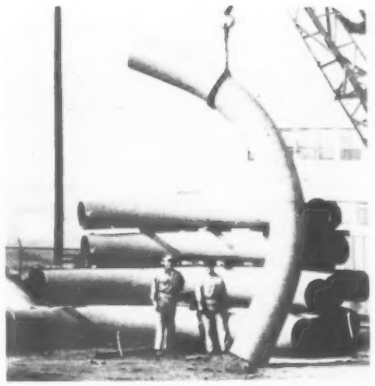


24-IN. PIPE bends in steel pipe fabricated at Los Angeles by Midwest Piping and Supply Co. Midwest made 56 of the bends for Gulf Oil Corp. oil-loading dock facilities at Kuwait, Arabia

P. R. Mallory Awarded For Good Labor Relations

A CITATION for "outstanding acheivements in human relations in labor" was recently awarded to P. R. Mallory & Co., Inc., at the sixth annual Leadership Forum, sponsored by the Indianapolis Junior Chamber of Commerce.

The company has long been a leader in the labor relations field. Most recent development in its policy was the adoption of a profit-sharing program, which has been in operation since June, 1947.

From the day in 1937 that Mallory signed its first union contract with the United Electrical Workers (C.I.O.), not a single hour of production has been lost because of labor trouble.

* * *

Mobile Betatron Installed At Naval Ordnance Lab

WORLD'S first mobile betatron, a ten-million-volt X-ray generator, is being installed at the Naval Ordnance laboratory, White Oak, Md. Built for the Bureau of Ordnance by the General Electric Co. at Schenectady, it will be used for studying internal assemblies of mines, torpedoes and other ordnance as well as examining thick sections of welded steel and armor plate.

The new betatron is housed in a steel housing four and one-half feet wide, four feet high and two and one-half feet deep. Moved by crane, it weighs about 5,500 lb and is installed in a room having 3-ft thick reinforced-concrete walls.

Radiology section of the Naval Ordnance laboratory is under the supervision of Donald T. O'Conner. Associated X-ray metallurgy section is headed by John Jerome Pierce. Radiographic activities in general are directed by Dr. Leslie W. Ball.

* * *

Ryerson Steel Builds Addition to Chicago Plant

JOSEPH T. RYERSON & SON, INC., is building a brick-and-steel addition to its Chicago plant that will provide about 118,000 sq ft of plant and office space. Completion is scheduled for November, 1949. The new L-shaped structure will be erected at 15th and Rockwell Streets.

Gas Welding Products Company Formed at La Crosse, Wis.

CONSULTING and manufacturing activities for the gas welding industry were recently started by the L. B. White Co., La Crosse, Wis. Products manufactured are a "set-up" pumice, a quick-lighting preheat torch and a medium temperature acetylene tip.

The acetylene tip is said to produce temperatures between the 6,300 F obtained from an oxyacetylene flame and the 3,200 F from air-acetylene, which makes it applicable for welding zinc based "white metals," aluminum brazing and silver brazing.

Mr. Lyall B. White, owner of the company, is a former member of the Chicago section of the American Welding Society and was previously with National Cylinder Gas Co.

* * *

Welded Motor Crane Called World's Largest

A WELDED 45-ton capacity two-engined motorized crane, said to be the world's largest, has been built by the Thew Shovel Co., Lorain, O., for Jones and Laughlin Steel Corp. It will be used in the latter company's Aliquippa Works.

The carrier, or rubber-tired mounting for transporting the crane, has a welded frame with multiple straight-beam construction. Side members are solid steel beams 18-in. deep and more than 2 in. thick. Each side member consists of two such beams between outriggers, with the inner beam running the full length of the frame. Side members are joined together by front bumper and outrigger boxes welded to the side members to serve as cross members.

Crane boom is all-welded with main chord members of high-tensile alloy steel. Boom is 50 feet in length, made up of 25-ft bottom and top sections. Center sections in lengths ranging from 5 to 25 feet may be used to give a maximum boom length of 100 ft.

* * *

Radiographic Service Offered By Vancouver, B. C., Group

A RADIOGRAPHIC service with personnel and equipment supplied at cost is being provided by the British Columbia Research Council, Vancouver, B. C.

Scope of the service includes routine inspection of pressure vessels and boilers, control by sampling, salvage of defective castings and the developing of superior production methods. The council has separate divisions of physics, applied biology, chemistry and engineering, as well as a foundry station and accommodation for pilot plant operations.

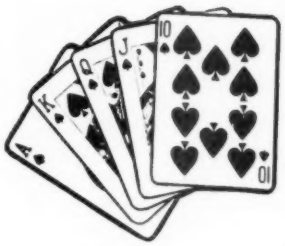
* * *

Indiana Firm Builds Branch in West Virginia

HAMILTON MFG. CORP., Columbus, Ind., maker of household stools and utility tables, is building a branch factory at Weirton, W. Va. The first building will be a Quonset-type structure, which will serve as a storage building when a larger plant is completed. The new facilities will produce resistance-welded tubing and stamped components for stools and tables.

Meco

Safe-T-Chek REGULATORS are a SURE BET for DEPENDABLE SERVICE!



Type GC Safe-T-Chek Regulator—for use in both light and heavy welding and cutting.

Only MECO can boast so many features—stainless steel valve nozzles, precision ground and checked under powerful magnification to assure accurate, uniform regulation and longer life. Stainless steel screw-clamped diaphragms provide for greater accuracy and strength because they are secured by torqued-on steel cap screws that neither crimp or distort out of shape.

Built-in Safe-T-Chek Valves protect the regulator against sudden high pressures—with Multi-Seats for uninterrupted production on the job. That's why MECO Regulators are always a *sure bet* for *dependable service.*

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Meco

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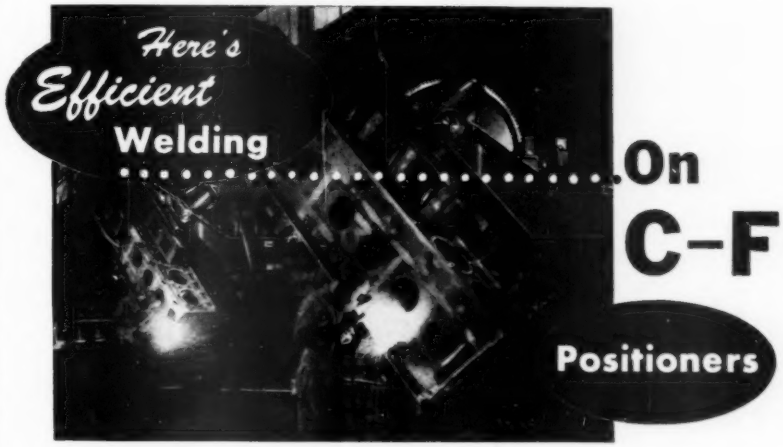

When heavy, unwieldy weldments like these diesel crank cases can be quickly swung into any position so that every weld is made **downhand**—that's efficient welding!

Weldors spend more time welding—do better welding at lower cost when they work with C-F Positioners because these hand and/or power operated machines reduce positioning time to a minimum. Investigate the cost-saving advantages of C-F Positioners. They pay their way in any company.

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Tool Engineers to Meet At Pittsburgh in March

THE seventeenth annual meeting of the American Society of Tool Engineers will be held March 10, 11 and 12 in Pittsburgh, according to Irwin F. Holland, president of the society. The meeting place is the William Penn Hotel where the technical sessions will also be held.

Eight plants in the Pittsburgh area will be toured as part of the program. The annual banquet will be held on Saturday evening, March 12, at which national officers and officers of the Pittsburgh chapter will be installed.

* * *

ASME Medals Awarded To Engineers, Scientists

THE American Society of Mechanical Engineering conferred its 1948 national honors and awards on some of the nation's leading scientists and engineers at an Honors Night dinner in New York City in December.

Dr. Frederick G. Keyes, head of the department of chemistry, Massachusetts Institute of Technology, Cambridge, Mass., was awarded the ASME medal for his work in teaching and administration plus his contributions to the knowledge of physical chemistry, thermodynamics and properties of gases.

Edward Smith Cole, president of the Pitometer Log Corp., New York City, was awarded the Worcester Reed Warner Medal for his work on methods of measuring the flow of water in conduits and the speed of ships.

The Holley Medal was bestowed on Edwin H. Land, president of the Polaroid Corp., Cambridge, Mass., for his valuable and unique work in polarized light and optics. Mr. Land invented the recently heralded camera that delivers a finished photo immediately after exposure is made.

Dr. Theodore von Karman was present to receive the John Fritz Medal. He has played a leading role in the development of jet propulsion, supersonics, ballistics, long range rockets and in various fields of physics and mathematics.

Reginald E. Gillmore, vice chairman of the National Securities Resources Board, Washington, D. C., and vice-president of the Sperry Corp., received the Melville Prize Medal, given for an original paper on an engineering subject. The junior award went to Hunt Davis, aerodynamics division engineer, research and development department, Elliot Co., Jeannette, Pa.

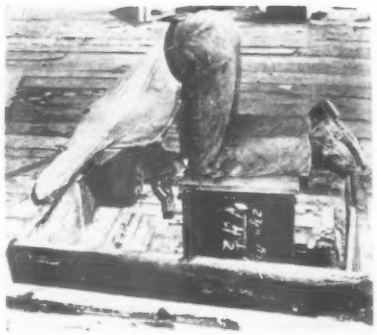
The Pi Tau Sigma Medal, given by the honorary engineering fraternity, went to Walter G. Vincenti, of the Ames Aeronautical Laboratory, Moffett Field, Calif.

* * *

Dry Chemical Extinguisher Puts Out Truck Fire

WHILE the crew of the Rochester, Pa., fire department ran out hose lines to fight a gasoline truck fire, recently, Chief Francis Heuring grabbed a portable Ansul fire extinguisher. The dry chemical had the fire out in a few seconds.

The truck transport was carrying 5,000 gallons of fuel which were about to ignite from the heat of the flaming rear tires. No gasoline was lost and the truck damage was slight.



BOTTOMS UP, a position not recommended for Monday mornings or close to people easily tempted. Though not mentioned in welding handbooks, the position was handy for welding the column caps on the five-story welded addition to the *Register and Tribune* building at Des Moines, Ia.

NWSA Southeastern Meeting Held at Memphis

SOUTHEASTERN zone meeting of the National Welding Supply Association was held at the Hotel Peabody, Memphis, Tenn., on Dec. 14. Willard C. Starcher, Spencer, W. Va., zone vice-president, was in charge of the gathering. Seventeen members were present.

The outstanding discussion of the day centered around the advisability of investigating a sales territory's possibilities before taking on a new line of equipment. Mutually valuable were the various members' recounts of 1948 sales as compared to 1947, their inventories, accounts receivable and general business conditions in their home areas.

Regular sales policies for manufacturers and possibilities for better manufacturer-distributor business relationships in the southeastern zone were also discussed.

The following distributor members were in attendance: Joseph H. Beaver, Leslie P. Beaver, Jr., C. E. Berry, B. F. Connor, Jackson Farris, Willis D. Lyon, J. M. Macey, V. S. Rice, H. R. Shannon, Hugh E. Simpkins, W. C. Starcher and Tom Taul. Three new members joined the association.

* * *

West Coast Firm Elects New Officers

LEE CAMERON has been elected president and general manager of Superweld Corp., Glendale, Calif. Mr. Cameron comes to the firm with experience at Vultee Aircraft Corp., Interstate Aircraft & Engineering Corp. and other aviation firms on the Pacific coast. Walter T. Wells, formerly president and general manager, has been named chairman of the board.

Secretary of the firm is S. S. Webster, Jr. Robert E. Jones, vice-president, was also elected treasurer. Directors include Mr. Wells and Mr. Jones, Harold C. Hill of General Electric Co., Los Angeles, and William M. West, of West & Co., Los Angeles.

The company was organized in May, 1948, with a capitalization of $500,000. It specializes in the electric copper brazing of steel, localized heat silver brazing and bright annealing.

New Officers Elected By Metallizing Contractors

PETER G. DENNISON was elected president at the annual meeting of the American Metallizing Contractors Association in Tulsa, Okla., in December. Knowles B. Smith was named vice-president and Walter B. Meyer was re-elected as secretary-treasurer.

Mr. Dennison is president and founder of The Metal Spraying Corp., Milwaukee. He developed the "flash coating" method for improving the bond of white metal castings to large area surfaces.

Mr. Smith is vice-president and general manager of the Dix Engineering Co., Inc., Lincoln Park, Mich. He is a graduate of DePauw University and Oxford University. An active member of the American Welding Society, he has been in metallizing work since 1941, in business and as a naval officer.

Mr. Meyer is manager of the metallizing division of the John Nooter Boiler Works Co., St. Louis. He has done metallizing work since 1935, including a tour of army duty installing metallizing equipment in China, India, Burma and Italy.

The board of directors consists of the following: Harry W. Moore, vice-president, Alloy Welding and Mfg. Co., Tulsa, Okla., chairman; Peter G. Dennison, vice-chairman; William H. Fatka, president of Metallizing, Inc., Chicago; Walter B. Meyer; K. B. Smith; H. S. Hammond, manager of Protective Coatings Division, of Metalweld, Inc., Philadelphia; M. H. Clark, Clark & Co., Newport Beach, Calif.; T. H. Lufkin, manager metallizing department of Tranter Mfg. Co., Pittsburgh; R. H. Forney, secretary-treasurer of Forney's, Inc., Newcastle, Pa.

The next meeting of the association will be held in Milwaukee on May 5, 6 and 7, 1949.

* * *

English Welder Manufacturer Completes New Construction

PETBOW, LTD., of England, has completed a large new factory, to be called the Richborough Works, at a site covering 70 acres at Sandwich, Kent, England. The company is the largest in the British Empire to be devoted wholly to the manufacture of arc welders and electrodes. It is retaining its factory at Balmoral Road, Watford, to which all correspondence should still be addressed.

* * *

New Foundry Opened By National Bearing

NATIONAL BEARING DIVISION of the American Brake Shoe Co. has opened a new non-ferrous foundry at Meadville, Pa. Operations have been discontinued at four former plants in Jersey City, Pittsburgh and Meadville, so that the company may concentrate production for the new foundry, which will greatly exceed the combined productive capacities of the four old plants.

The new Meadville plant has a total floor area of 185,000 sq ft, including a two-story office and employee service building. Its total melting capacity is about 200,000 lb a day. Heats are made up in units of 800 lb, and an average of 12 different alloys are poured in a day.

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This exclusive, easy-to-operate TRINDL WELDER is a big saver for any shop . . . MODEL 125A is ruggedly built . . . Can easily be carried right to the job and connected to any convenient properly wired 110 volt 50-60 cycle AC supply line . . . With it you can BUILD OR REPAIR auto and home appliance, farm implements and tools . . . Fabricate special shop equipment, jigs and fixtures out of prime or scrap sheets, bars and tubes and do hundreds of other repair and construction welding jobs when you need them and as you want them done. MODEL 125A has 16 heat stages ranging from 20 to 125 amps, handles 1-16" to 5-32" rods . . . Comes Complete Ready to Operate—Nothing Else to Buy. Also available for 220 and other voltages at slight additional cost.

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General Electric Builds All-Welded Turbine Plant

COVERING 20 acres of land and having more than a million sq ft of floor space, an all-welded plant for turbine production is approaching completion at Schenectady. The building is 650 ft wide and 1290 ft long.

Above ground, 14,800 tons of structural steel were field connected by arc welding. Because of the very large machines and cranes employed in turbine manufacture, a total of 4,700 steel H-beam piles were driven into the ground in varying depths of 80 to 140 feet to support building columns and the concrete sub-floor mat. Over the two-acre steel pile area and at a depth seven feet below the regular floor, a 16-in. reinforced concrete mat was laid. The pit above this mat was filled with fine crushed stone topped by a 10-in. reinforced concrete floor slab. On this slab are laid 2-in. square wood blocks to form the operating floor.

Sides of building are concrete for the first 5 feet up to the window sash. Remainder will be insulated metal siding protected with aluminum paint. The plant will employ about 5,000 persons when it is completed.

* * *

OTS Reports Welding High-Strength Aluminum Alloys

NEW findings on the welding of high-strength aluminum alloys are described in a report just released by the Office of Technical Services of the Department of Commerce.

Three approaches to the improvement of welded joints are discussed in the report: development of improved filler metals, effects of various heat treatments and use of unorthodox joining methods including cold pressure welding.

Study was carried out by Battelle Memorial Institute for the army. Results from welding processes using currently available filler metals are in complete form.

Conventional welded joints were found to have only from 5 to 30% of the ductility of parent plates. Tensile efficiencies of welded joints were found to be markedly improved by full heat-treating.

Report PB92831, "Investigation on the Welding of High-Strength Aluminum Alloys," can be obtained in photostat form for $8.75 or in microfilm form for $3. Orders should be addressed to the Library of Congress, Photoduplication Service, Publication Board Project, Washington 25, D. C., accompanied by check or money order payable to the Librarian of Congress.

* * *

Arc-Cutting Crops Hot Tops of Ingots

A NEW process for the hot-topping of alloy ingots is expected to increase materially the production of steel in 1949. In this process, developed by the General Electric Co., a non-consumable electrode is positioned automatically by a small d-c motor and a voltage regulator of the amplidyne or electronic type. A motor-generator welder is used for the current source.

About People

C. W. LYTTON has been named district manager for Lincoln Electric Co. for the Buffalo, N. Y. area. C. M. RICHARDSON is the new district manager for the northwestern Pennsylvania district with his office at Franklin, Pa. RAY ZEH has been appointed district manager of the Toledo, O., district.

* * *

W. A. REDPATH has been appointed manager of the Philadelphia plant of Joseph T. Ryerson & Son, Inc., steel distributors, to succeed C. L. Hardy. Mr. Hardy was recently elected assistant vice-president of the Ryerson organization.

* * *

THOMAS J. LINGLE has been named as western division manager of Taylor Forge & Pipe Works in charge of manufacturing operations at Fontana, Calif.

* * *

HENRY L. MARION, EDGAR P. DUNLAEVY and WEIGHTMAN EDWARDS have been elected vice-presidents of the Phelps Dodge Copper Products Corp., New York City.

* * *

WILLIAM E. MASSEY has been named general manager of Weldit, Inc., Detroit, Mich. He will continue as vice-president. JOSEPH C. SMITH has been appointed sales manager of the firm.

* * *

HOWARD N. SIMMS, formerly metallurgist at the Oklahoma City plant of Black, Sivalls, and Bryson, Inc., has been appointed director of quality control for the organization. His headquarters will be in Kansas City.

* * *

E. A. (ERNIE) BUSSARD is now process engineer for the Coleman Lamp and Stove Co., Wichita. He was previously welding engineer of the same firm. Mr. Bussard is a member of the resistance welding committee of the American Welding Society and is a past chairman of the society's Wichita Chapter.

* * *

N. GEORGE BELURY has been appointed president of the Engineered Castings Division of the American Brake Shoe Co. Mr. Belury will be located at the division's headquarters in Rochester, N. Y.

* * *

A. S. THAELER, well-known marine designer, has been appointed assistant marine engineer of the Pittsburgh Steamship Co. Mr. Thaeler was formerly acting chief engineer of the Federal Shipbuilding and Dry Dock Co., Kearny, N. J.

FRANK L. OLDROYD has assumed his duties as sales manager of the industrial division of Oakite Products, Inc., New York City.

* * *

MALCOLM PIRNIE, of Malcolm Pirnie Engineers, New York City, was named 1948 winner of the Hoover Medal, jointly awarded by the ASME, ASCE, AIEE and AIMME. The award is in special recognition of Mr. Pirnie's leadership in the formulation of a program sponsored by the Engineers Joint Council for the postwar industrial control of Japan and Germany.

* * *

CHARLES LUKENS HUSTON, first vice-president of Lukens Steel Co., Coatesville, Pa., commenced his 74th year of continuous service with the company in December. Mr. Huston, 93, is the designer of the Lukens 206-in. plate mill, largest in the world.

* * *

R. D. HILLER, JR., has been promoted to south central regional manager for Gar Wood Industries, Inc., with his headquarters at Tulsa, Okla. W. A. WILLIAMS was appointed district manager to replace Mr. Hiller.

* * *

ALDEN G. ROACH, president of Consolidated Western Steel Corp., Los Angeles, has succeeded J. LESTER PERRY as president of Columbia Steel Co., Pittsburg, Calif.

* * *

EDWARD C. MEAGHER, treasurer of the Texas Gulf Sulphur Co., New York City, was elected president of United Engineering Trustees, Inc., New York City.

* * *

Died . . .

BENJAMIN K. SMITH, president of the Big Three Welding Equipment Co., Inc., Fort Worth, Tex., and head of a chain of oxygen plants in 13 southwest cities, died of a heart attack on Dec. 17 in St. Joseph's Infirmary, Houston, Tex. He was 66 years old.

A native of Dresden, Germany, Mr. Smith came to America in 1903, after studying metallurgy in Germany. He came to Houston in 1920 and established the Big Three Welding Equipment Co., headquarters of which are now at Ft. Worth. This concern was reported to have done a $14,000,000 business last year. Mr. Smith was also president of Houston Oxygen Co., San Antonio Oxygen Co., and Corpus Christi Oxygen Co. In private life, he was widely known to Houston stamp collectors for his valuable collection.

* * *

HOWARD SWEET, president of Purity Cylinder Gases, Inc., Grand Rapids, Mich., died on Dec. 10 at Mayo Brothers' Clinic, Rochester, Minn. He was 39 years old. Mr. Sweet had formed the company in 1938 with two close friends, Glenn G. Garman and Edward Butterfield. The company now has three branches, Kalamazoo, Lansing and Warsaw, Ind., besides the home office.

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- Stainless Steel Electrodes
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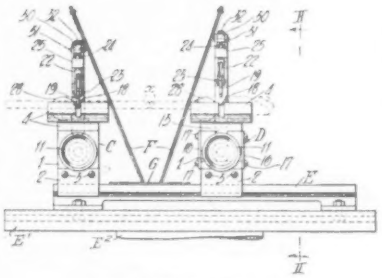
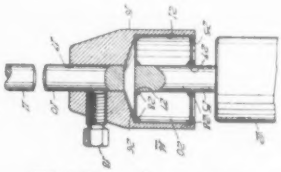


Small Welding Jig

2,453,046. WILLARD J. SUTTON, Gary, Ind. Filed Apr. 5, 1946. Issued Nov. 2, 1948.

A jig for welding comprises a bed, an upright stand fixed to the bed, another upright stand slidably carried by the bed and freely movable relative to the first stand. A jaw fixed to one of the stands has a work receiving notch. A jaw carried by the other stand has a vertical adjustment. A clamp is carried by the stand having the adjustable jaw. Posts carried by each of the stands have arms overhanging the notches of the jaws. Work clamps carried by the arms are operable with the jaws for clamping work pieces.

* * *



Welding Apparatus

2,452,010. FOSTER R. WOODWARD, Pleasant Ridge, Mich., assigned to Westinghouse Electric Corp., East Pittsburgh, Pa. Filed May 21, 1946. Issued Oct. 19, 1948.

A holder for a spot welding electrode comprises a stem, a socket for the electrode and means connecting the stem and socket. This includes a flat resilient current conducting means positioned in the recess connected to the stem and to the socket.

* * *

Electrode Holder

2,452,199. JOHN L. KING, Detroit, Mich., assigned to Miracle Lubricating Co., Detroit. Filed April 18, 1946. Issued Oct. 26, 1948.

A welding electrode holder has a pair of members provided at their forward ends with holding jaws. A handle, into which the rearward portion of the members extends has a fulcrum between them adjacent their rearward end. A cam located adjacent the fulcrum acts on the members to swing open the jaws. A second cam located at a distance from the fulcrum acts on the members to swing close the jaws.

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Aluminum Solder
White Metal

Welding Alloys Manufacturing Co.
744 Broad St., Newark 2, N. J.

Did you read Page 38

"What Welding Means to America"

The first of a series of articles on the part welding is playing in making this nation great.

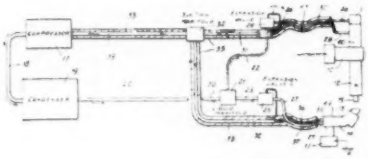
•

DON'T MISS IT!

THE WELDING ENGINEER

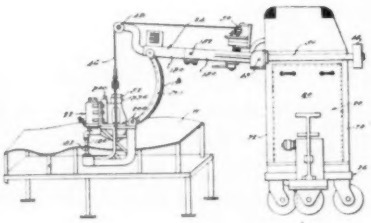
Refrigerated Electrode

2,448,396. Carl L. Schebler, St. Louis, Frank Douglas, Brentwood, and Ledru A. Clasquin, Riverview Gardens, Mo., assigned to The Emerson Electric Mfg. Co., St. Louis, Mo. Filed Dec. 2, 1943. Issued Aug. 31, 1948.



A method of controlling the temperature of electrodes. Apparatus consists of an expansion chamber in heat-transferring relationship with the electrode, and a refrigerant liquid. The liquid absorbs heat and evaporates in the chamber. Evaporated refrigerant is withdrawn from the chamber for reconversion and recirculating. Supply of liquid refrigerant is maintained in the chamber.

* * *

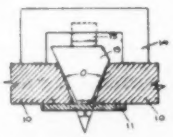


Welding Mechanism

2,449,707. Chester F. Leathers, Detroit, Mich. Filed July 17, 1944. Issued Sept. 21, 1948.

This patent pertains to a welding system with a portable welder. A hanger mechanically supports the welder and serves as a bus-bar through which power is delivered to the welder. An adjustable supporting connection is between the welder and the hanger. A flexible conductor electrically connects the welder to the hanger.

* * *



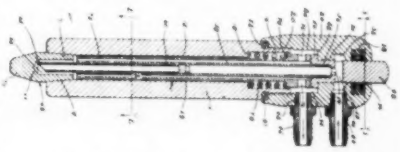
Butt-Weld Preparation

2,449,082. Louis P. McCabe, Hollis, N. Y. Filed Apr. 5, 1946. Issued Sept. 14, 1948.

A method for preventing distortion of plates during butt-welding. Facing surfaces are beveled so that they subtend an angle between 15 and 45 deg. Prior to the welding process, a wedge whose subtended angle is greater by 3 to 5 deg. than the angle subtended by the beveled surfaces is put between the surfaces. A constant force is applied against the butt of the wedge during the welding process.

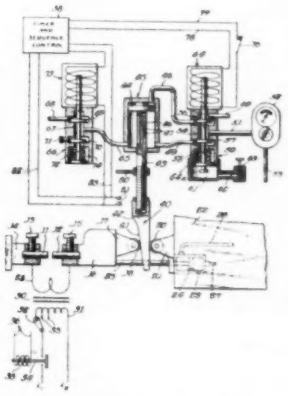
R-W Tip Holder

2,453,320. Ernest W. Huebner, Detroit, Mich., assigned to Weiger Weed & Co., Detroit. Filed July 26, 1946. Issued Nov. 9, 1948.



An R-W tip holder has a socket at one end for frictionally retaining a tip and a head member detachably connected to the opposite end of the tubular holder. The head is tubular and has a fluid inlet and outlet ports. A rod projects through the end of the head movable axially therein and separates the inlet port from the outlet port. An outwardly extending flange on the rod limits outward movement of the rod. A tubular member within the tubular holder has one end in contact with the inner end of the rod. The tube is in fluid communication with the outlet port and open at its opposite end. A second tubular member is within the first named tube and spaced from the inner wall. The second tube is carried by the rod and has a fluid communication through the rod to the fluid inlet passage. A spring urges the first tube into contact with the rod for urging outwardly.

* * *



Welding Apparatus

2,455,526. David Sciaky, Chicago, Ill., assigned to Welding Research, Inc., Chicago. Filed Sept. 10, 1945. Issued Dec. 7, 1948.

A patent welding apparatus which has electrodes for holding workpieces to be welded. A movable slide supports one electrode for reciprocating movement toward and from the other electrode. A taper cam member is adapted to reciprocate in a direction normal to the direction of movement of the slide. This cam member has a cam surface of characteristic contour for imparting movement to the slide. A pressure cylinder reciprocates the cam member. Control means for the pressure cylinder includes valves for selectively admitting a fluid to the respective ends of the cylinder and for venting at a controlled increasing rate of discharge to regulate travel of the piston.

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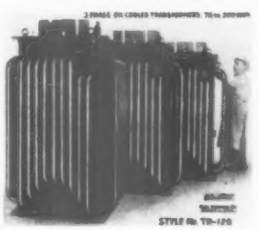

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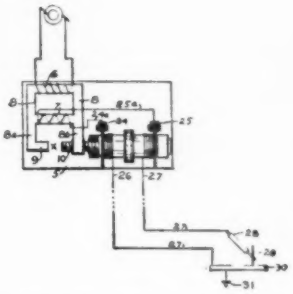
Welding Transformer

2,449,649. James Donovan Forney, Fort Collins, Colo. Filed Oct. 8, 1945. Issued Sept. 21, 1948.



An adjustable welding transformer has a primary and a secondary core with a magnetic shunt about the secondary. Shunt comprises an air gap with one of the poles of the air gap having a threaded opening. A threaded member of magnetic material is positioned in the opening in engagement with the threads. When the magnetic member is rotated its end will move relative to the other pole. A drum is mounted on the outer end of the magnetic member and interconnected by means permitting relative axial but not rotary movement. Two flanges of electrically conducting material are secured to the drum in spaced relation. An electrical conductor is connected to each flange and wound around the conductor in opposite directions, whereby the drum can be rotated in either direction.

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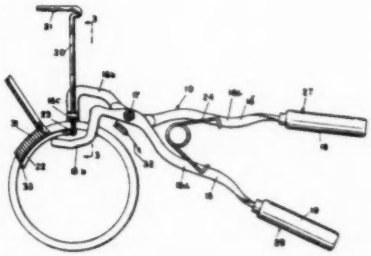

Method for Pipe Welding

2,449,371. Emery Dutch, New York City. Filed July 20, 1945. Issued Sept. 14, 1948.

Patent pertains to a method for protecting and keeping smooth the inside of a welded portion of the ends of two pipes placed adjacent to but spaced apart from one another. It comprises a back-up plate and means to turn it edgewise and to insert it into the inside of the pipes through the space between them. Plate is then adapted to be turned flat to the walls of the pipes and to overlap the space between them. Means to press the plate against the walls from the inside is exerted from the outside. Plate prevents the welding filler from protruding into the inside of the pipes. Means operable from the outside is adapted to release the back-up plate and allow the moving of the same against an adjacent portion of the space between the pipes. Adjacent portion may then be filled with welding filler. Portions of back-up plate are adapted to again be turned edgewise to the space and to be so removed from the inside of the pipes.

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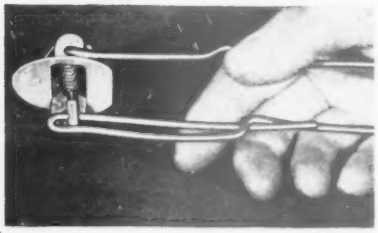

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Soldering Iron

2,449,521. Samuel W. Warner, Newark, N. J., assigned one-half to Herman Bernstein and one-half to Joe Sodowick. Filed Sept. 26, 1945. Issued Sept. 14, 1948.

Soldering iron is of a shape and size so that it may be held in the hand like a pencil in writing. It comprises opposed tubular arms having flattened portions arranged near and spaced from their rear ends. Rear ends of the tubular arms form tubular sockets for receiving the ends of wires connected with the opposite poles of a source of current. The tubular sockets are squeezed upon the wires for clamping connection. Electrodes are removably mounted within the forward ends of the tubular arms.

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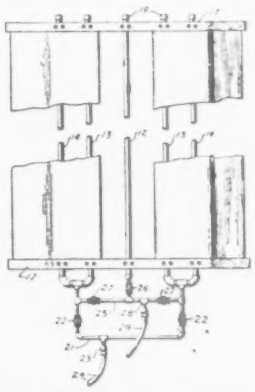

Stress Relieving Apparatus

2,449,760. Clay P. Bedford, Berkeley, Calif., assigned to The Kaiser Co., Oakland, Calif. Filed Sept. 14, 1944. Issued Sept. 21, 1948.

Apparatus for relieving residual stresses in metal plates joined by a weld comprises a number of inverted channel-shaped frame members adapted to be supported on the plates. A pair of parallel heat-retaining hoods are secured to and spaced apart by the frame members so as to provide an open space between. Each of the hoods includes a vertically disposed inner baffle. Fluid discharge means is supported within the open space by the frame members and extends along a substantial length of the weld so as to deliver a cooling fluid to the weld and to a tension zone immediately adjacent and lying on both sides. A number of longitudinally aligned burners supported by the frame members within each of the hoods extends substantially the length of the weld. Each of the burners has a number of fluid discharge jets, those close to the vertically disposed inner baffle being directed vertically downwardly and those disposed toward the outer baffle being directed outwardly at an angle so that the greatest heat under the hood is applied to the plates directly adjacent the lines of demarcation between the tension and compression zones. The heat applied is gradually reduced as the distance from the lines increases.

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